

## **FINAL REPORT**

# **ECONOMIC ANALYSIS OF CRITICAL HABITAT DESIGNATION FOR THE ARROYO TOAD**

Prepared for:

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## EXECUTIVE SUMMARY AND REPORT ORGANIZATION

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The purpose of this report is to identify and analyze the potential economic impacts associated with critical habitat designation (CHD) for the Arroyo Toad (*Bufo Californicus* or AT). Economic & Planning Systems, Inc. prepared this report for the U.S. Fish and Wildlife Service (Service).

- 10 Section 4(b)(2) of the Endangered Species Act (Act) requires the Service to designate critical habitat (CH) on the basis of the best scientific data available, after taking into consideration the economic impact, and any other relevant impact, of specifying any particular area as CH. The Service may exclude areas from CHD when the benefits of exclusion outweigh the benefits of including the areas within CH, provided the exclusion will not result in extinction of the species.<sup>1</sup> In addition, this analysis provides information to allow the Service to address the requirements of Executive Orders 12866 and 13211, and the Regulatory Flexibility Act (RFA), as amended by the Small Business Regulatory Enforcement Fairness Act (SBREFA).<sup>2</sup> This report also complies with direction from the U.S. 10<sup>th</sup> Circuit Court of Appeals that, when deciding which areas to designate as CH, the economic analysis informing that decision should include “co-extensive” effects.<sup>3</sup>
- 20 This analysis considers the potential economic effects of AT conservation activities in the proposed CHD both historically since the listing and prospectively. Actions undertaken to meet the requirements of other Federal, State, and local laws and policies may afford protection to the AT and its habitat, and thus contribute to the efficacy of CH-related conservation and recovery efforts. Thus, the impacts of these activities are relevant for understanding the full impact of the proposed CHD.

- 30 This analysis considers both economic efficiency and distributional effects. In the case of habitat conservation, efficiency effects generally reflect the opportunity costs associated with the commitment of resources to comply with habitat protection measures (e.g., lost economic opportunities associated with restrictions on land use). This analysis also addresses how potential economic impacts are likely to be distributed, including an assessment of any local or regional impacts of AT conservation and the potential effects of conservation activities on small entities and the energy industry. This information can be used by decision-makers to assess whether the effects of the designation might unduly burden a particular group or economic sector. It is important to note that

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<sup>1</sup> 16 U.S.C. §1533(b)(2).

<sup>2</sup> Executive Order 12866, “Regulatory Planning and Review,” September 30, 1993; Executive Order 13211, “Actions Concerning Regulations That Significantly Affect Energy Supply, Distribution, or Use,” May 18, 2001; 5 U.S.C. §§601 *et seq*; and Pub Law No. 104-121.

<sup>3</sup> In 2001, the U.S. 10<sup>th</sup> Circuit Court of Appeals instructed the Service to conduct a full analysis of all of the economic impacts of proposed critical habitat designation, regardless of whether those impacts are attributable co-extensively to other causes (*New Mexico Cattle Growers Ass’n v. U.S.F.W.S.*, 248 F.3d 1277 (10<sup>th</sup> Cir. 2001)).



40 measures of regional economic impact are entirely distinct from the reported efficiency effects. As such, these two measures of impact cannot be directly compared and should not be summed.

## BACKGROUND OF AT CRITICAL HABITAT DESIGNATION

50 The AT was listed as an endangered species on December 16, 1994 and CH was first designated for the AT in February 2001. The original CHD was remanded in October 2002 (*Building Industry Legal Defense Foundation, et al., v. Gale Norton, Secretary of the Interior, et al., and Center for Biological Diversity, Inc. and Defenders of Wildlife, Inc.*). The Service made available for public comment a new proposed CHD on April 28, 2004. The AT CHD proposed in April 2004 covers drainages located in Monterey, Santa Barbara, Ventura, Los Angeles, San Bernardino, Riverside, Orange, and San Diego Counties, California. In sum, there are 23 units of proposed CH. A number of areas considered essential habitat for the AT are proposed for exclusion from the CHD due to either an existing Service-approved habitat conservation plan (HCP) or mission-essential military training area status.

Approximately 59 percent of the CHD proposed in April 2004 is privately owned land, 34 percent is under Federal ownership, 5 percent is State or locally owned, and the remaining 2 percent is Tribal. **Table ES-1** presents the current ownership of acreage within the proposed CHD.

**Table ES-1**  
**Summary of Estimated Land Ownership within April 2004 Proposed Critical Habitat**  
**Economic Analysis of CHD for the Arroyo Toad**

Landowner	Acres within CHD
Bureau of Land Management	1,475
US Forest Service	32,792
US Fish and Wildlife Service	755
Tribal Lands	3,082
Military	12,492
State/local	6,861
Private	81,256
<b>TOTAL</b>	<b>138,713</b>

Source: *Proposed Designation of Critical Habitat for the Arroyo Toad, April 28, 2004.*

60

In the Notice of Availability (NOA) for the draft economic analysis, the Service revised the April 2004 proposed designation (referred to as the 2005 reproposal). As described in the NOA, the revisions reduce the total acreage proposed for CHD and do not include any new areas. This Final Report presents estimated economic impacts based on the 2005 reproposal. The Final Report does not incorporate any public comments regarding the draft economic analysis.

## RESULTS OF THE ANALYSIS

70 This analysis addresses the impacts of AT conservation efforts on activities occurring on lands proposed for designation as well as those proposed for exclusion. This analysis measures lost economic efficiency associated with real estate development, changes in water supply, grazing activities, mining activities, road construction projects, utility and other infrastructure projects, military activities, as well as CEQA, uncertainty, delay, and HCP creation. Additionally, impacts to regional economic output and jobs associated with possible increases in water prices borne by water consumers are considered.

80 There is a great deal of uncertainty in estimating the impact of AT-related conservation activities in the future. For example, the analysis projects significant future cost to private developers as a result of AT conservation activities even though these costs have been relatively minimal in the past. This is likely because the presence of the AT is relatively difficult to determine, which may become less of a factor once CH is designated. Furthermore, it is very difficult to estimate the reductions in water supply that will result from future AT-related conservation measures. Thus, the analysis calculates an upper-bound cost estimate associated with AT-related changes in water operations. The implicit lower-bound cost estimate is no impact. The “Caveats to the Economic Analysis” section of this Executive Summary describes additional uncertainties affecting this analysis.

90 Future economic impacts expected to result from AT-related conservation activities within CHD are summarized in **Table ES-2** and discussed below. To illustrate where specific impacts are expected to occur, the results of the analysis are presented by project type and management unit. **Table ES-3** presents estimated future impacts within excluded essential habitat (EH). **Table ES-4** describes estimated past impacts within CHD.

### **Efficiency Impacts**

As shown in **Table ES-2**, total efficiency costs are estimated to be approximately \$1 billion between 2004 and 2025. These costs are expressed as present value estimates with future costs discounted at 7 percent to take into account the time value of money (i.e., costs incurred far off in the future are weighted lower than costs incurred in the short term). Overall, the real estate industry is estimated to experience the highest cost,

Table ES-2  
Summary of Future Impacts within Proposed Critical Habitat (2004-2025) [1]  
Economic Analysis of Critical Habitat Designation for the Arroyo Toad

CH Unit	Real Estate Development	Water Supply	Grazing	Mining	Road Construction	Utilities & Infrastructure	Military	CEQA	Delay	Consultations	Total
1	--	--	--	--	--	--	--	--	--	--	--
2	\$495,818	\$0	\$206,071	\$113,634	\$4,265	\$2,753	\$0	\$46,237	\$175	\$195,854	\$1,064,808
3	\$4,158	\$20,723,533	\$0	\$0	\$1,945	\$1,255	\$0	\$388	\$1	\$64,057	\$20,795,338
4	\$7,044	\$0	\$0	\$0	\$0	\$27	\$0	\$193	\$7	\$50,057	\$57,328
5	\$469,238	\$14,577,817	\$79,009	\$0	\$65,103	\$27,071	\$0	\$14,088	\$415	\$164,990	\$15,397,732
6	\$16,478,034	\$0	\$0	\$113,634	\$116,436	\$63,143	\$0	\$495,772	\$14,499	\$653,901	\$17,935,420
7	\$26,595,346	\$7,371,711	\$0	\$0	\$59,865	\$32,465	\$0	\$797,572	\$23,641	\$905,823	\$35,786,422
8	\$1,846,467	\$0	\$0	\$0	\$18,416	\$9,987	\$0	\$23,498	\$2,053	\$79,863	\$1,980,285
9	\$902	\$0	\$31,604	\$0	\$6,121	\$1,107	\$0	\$8	\$1	\$73,881	\$113,623
10	\$53,556,520	\$0	\$0	\$0	\$331,446	\$200,920	\$0	\$685,210	\$59,898	\$864,049	\$55,698,042
11	\$15,506,387	\$0	\$0	\$0	\$1,660,536	\$39,082	\$279,557	\$195,877	\$17,069	\$245,802	\$17,944,309
12	\$39,732,614	\$0	\$0	\$0	\$392,795	\$24,954	\$0	\$225,921	\$34,604	\$293,775	\$40,704,662
13	\$33,343,394	\$0	\$0	\$113,634	\$274,167	\$148,681	\$0	\$190,686	\$29,149	\$391,060	\$34,490,769
14	\$133,637,837	\$8,052,138	\$0	\$113,634	\$565,691	\$174,625	\$0	\$756,949	\$116,278	\$991,626	\$144,408,779
15	\$79,652,869	\$0	\$26,336	\$0	\$0	\$72,035	\$0	\$452,967	\$69,392	\$576,394	\$80,849,993
16	\$167,881,154	\$9,675,492	\$0	\$0	\$852,174	\$174,784	\$0	\$955,112	\$146,205	\$1,162,394	\$180,847,315
17	\$40,494,586	\$29,727,685	\$89,543	\$0	\$0	\$167,907	\$0	\$230,664	\$35,244	\$500,301	\$71,245,930
18	\$94,338,577	\$1,904,835	\$0	\$113,634	\$0	\$194,826	\$0	\$536,685	\$82,136	\$782,793	\$97,953,486
19	\$202,027,475	\$738,221	\$226,492	\$0	\$0	\$288,864	\$0	\$1,147,537	\$175,964	\$1,592,669	\$206,197,222
20	\$2,822,008	\$0	\$0	\$0	\$133,890	\$72,609	\$0	\$56,123	\$3,152	\$152,232	\$3,240,014
21	\$0	\$0	\$0	\$0	\$46,315	\$25,117	\$0	\$0	\$0	\$66,275	\$137,707
22	\$25,400,954	\$0	\$22,122	\$0	\$264,356	\$41,074	\$0	\$496,663	\$25,136	\$593,042	\$26,843,347
23	\$2,282,188	\$1,943,709	\$0	\$0	\$62,151	\$33,705	\$0	\$19,677	\$2,560	\$104,607	\$4,448,597
<b>Total</b>	<b>\$936,573,569</b>	<b>\$47,357,570</b>	<b>\$681,177</b>	<b>\$568,169</b>	<b>\$4,855,672</b>	<b>\$1,796,990</b>	<b>\$279,557</b>	<b>\$7,327,828</b>	<b>\$837,580</b>	<b>\$10,505,444</b>	<b>\$1,010,783,557</b>
<b>Annualized Impacts (2)</b>	<b>\$86,435,440</b>	<b>\$4,370,583</b>	<b>\$62,865</b>	<b>\$52,436</b>	<b>\$448,125</b>	<b>\$165,842</b>	<b>\$25,800</b>	<b>\$676,278</b>	<b>\$77,299</b>	<b>\$969,537</b>	<b>\$93,284,205</b>
<b>Regional Impacts</b>											
Employment		82	--	--	--	--	--	--	--	--	82
Output		<b>\$10,176,657</b>	--	--	--	--	--	--	--	--	<b>\$10,176,657</b>

(1) Impacts are discounted at 7 percent and presented in present value terms using 2004 dollars.

(2) Annualized impacts are calculated using a discount rate of 7 percent.

**Table ES-3**  
**Summary of Future Impacts within Excluded Habitat (2004 - 2025) [1]**  
**Economic Analysis of Critical Habitat Designation for the Arroyo Toad**

<b>EH Unit</b>	<b>Real Estate Development</b>	<b>Water Supply</b>	<b>Grazing</b>	<b>Mining</b>	<b>Road Construction</b>	<b>Utilities &amp; Infrastructure</b>	<b>Military</b>	<b>CEQA</b>	<b>Delay</b>	<b>Consultations</b>	<b>Total</b>
1	\$177	\$0	\$0	\$0	\$812	\$524	\$90,000	\$9	\$0	\$50,214	\$141,736
2	--	--	--	--	--	--	--	--	--	--	--
3	--	--	--	--	--	--	--	--	--	--	--
4	--	--	--	--	--	--	--	--	--	--	--
5	--	--	--	--	--	--	--	--	--	--	--
6	\$67,272,527	\$3,160,957	\$0	\$0	\$122,028	\$61,809	\$0	\$2,051,656	\$60,422	\$2,167,528	\$74,896,927
7	--	--	--	--	--	--	--	--	--	--	--
8	\$10,153,424	\$0	\$0	\$0	\$83,132	\$9,987	\$0	\$129,221	\$10,822	\$138,012	\$10,524,598
9	\$31,383,928	\$0	\$0	\$0	\$132,123	\$71,097	\$0	\$269,676	\$34,602	\$316,827	\$32,208,253
10	\$0	\$0	\$0	\$0	\$1,093	\$593	\$0	\$0	\$0	\$387	\$2,073
11	\$15,073	\$0	\$0	\$0	\$0	\$31,477	\$1,118,226	\$190	\$16	\$45,685	\$1,210,668
12	\$28,484	\$0	\$0	\$0	\$0	\$22,571	\$0	\$162	\$32	\$14,906	\$66,155
13	\$65,760,065	\$0	\$0	\$0	\$146,469	\$78,877	\$0	\$544,608	\$72,687	\$597,527	\$67,200,234
14	\$39,729	\$0	\$0	\$0	\$0	\$69,258	\$0	\$226	\$45	\$45,465	\$154,722
15	--	--	--	--	--	--	--	--	--	--	--
16	\$66,674,771	\$0	\$0	\$0	\$0	\$156,440	\$0	\$376,649	\$75,258	\$481,641	\$67,764,758
17	\$99,545,801	\$0	\$0	\$0	\$0	\$104,554	\$0	\$571,728	\$112,276	\$644,283	\$100,978,642
18	\$28,961,609	\$0	\$0	\$0	\$0	\$54,621	\$0	\$164,783	\$32,679	\$201,690	\$29,415,382
19	\$54,638,882	\$0	\$0	\$0	\$0	\$260,182	\$0	\$310,810	\$61,654	\$483,074	\$55,754,601
20	--	--	--	--	--	--	--	--	--	--	--
21	--	--	--	--	--	--	--	--	--	--	--
22	\$24,269,623	\$0	\$0	\$0	\$75,741	\$41,074	\$0	\$471,535	\$24,496	\$488,393	\$25,370,861
23	--	--	--	--	--	--	--	--	--	--	--
<b>Total</b>	<b>\$448,744,092</b>	<b>\$1,580,478</b>	<b>\$0</b>	<b>\$0</b>	<b>\$561,398</b>	<b>\$963,062</b>	<b>\$1,208,226</b>	<b>\$4,891,254</b>	<b>\$484,990</b>	<b>\$5,675,632</b>	<b>\$465,689,612</b>
<b>Annualized Impacts (2)</b>	<b>\$41,414,144</b>	<b>\$145,861</b>	<b>\$0</b>	<b>\$0</b>	<b>\$51,811</b>	<b>\$88,880</b>	<b>\$111,506</b>	<b>\$451,409</b>	<b>\$44,759</b>	<b>\$523,798</b>	<b>\$42,978,029</b>
<b>Regional Impacts</b>											
Employment		3	--	--	--	--	--	--	--	--	3
Output		\$396,848	--	--	--	--	--	--	--	--	\$396,848

(1) Impacts are discounted at 7 percent and presented in present value terms using 2004 dollars.

(2) Annualized impacts are calculated using a discount rate of 7 percent

Table ES-4  
Summary of Past Impacts within Proposed Critical Habitat (1994 - present) [1]  
Economic Analysis of Critical Habitat Designation for the Arroyo Toad

CH Unit	Real Estate Development	Water Supply	Grazing	Mining	Major Road Construction	Other Road Construction	Utilities & Infrastructure	Military	Consultations (2)	Total
1	\$0	\$0	0	\$0	\$0	\$0	\$0	\$0	-	\$0
2	\$0	\$0	209,242	\$386,505	\$0	\$0	\$0	\$0	-	\$595,747
3	\$0	\$0	0	\$0	\$0	\$0	\$0	\$0	-	\$0
4	\$0	\$0	0	\$0	\$18,900	\$0	\$0	\$0	-	\$18,900
5	\$0	\$0	136,791	\$0	\$0	\$14,465	\$124,110	\$0	-	\$275,367
6	\$0	\$0	0	n/a	\$365,223	\$4,502	\$579,738	\$0	-	\$949,463
7	\$0	\$0	0	\$0	\$0	\$0	\$0	\$0	-	\$0
8	\$0	\$0	0	\$0	\$0	\$0	\$0	\$0	-	\$0
9	\$0	\$0	11,449	\$0	\$0	\$0	\$0	\$0	-	\$11,449
10	\$0	\$0	0	\$0	\$994,862	\$0	\$261,197	\$0	-	\$1,256,059
11	\$0	\$0	0	\$0	\$371,177	\$0	\$122,193	\$361,858	-	\$855,228
12	\$0	\$0	0	\$0	\$0	\$0	\$13,790	\$0	-	\$13,790
13	\$0	\$0	0	n/a	\$76,000	\$0	\$13,790	\$0	-	\$89,790
14	\$8,045,916	\$0	0	\$0	\$2,553,326	\$0	\$708,721	\$0	-	\$11,307,964
15	\$0	\$0	85,909	\$39,602	\$0	\$3,435	\$13,790	\$0	-	\$142,736
16	\$0	\$0	0	\$0	\$0	\$0	\$13,790	\$0	-	\$13,790
17	\$0	\$0	171,819	\$0	\$0	\$0	\$146,588	\$0	-	\$318,407
18	\$0	\$0	0	\$63,558	\$0	\$0	\$155,884	\$0	-	\$219,442
19	\$0	\$0	533,840	\$0	\$0	\$5,155	\$13,790	\$0	-	\$552,785
20	\$0	\$0	0	\$0	\$0	\$0	\$0	\$0	-	\$0
21	\$0	\$0	0	\$0	\$0	\$4,817	\$0	\$0	-	\$4,817
22	\$8,113,118	\$0	13,298	\$0	\$1,235,850	\$0	\$0	\$0	-	\$9,362,266
23	\$0	\$0	0	\$0	\$0	\$0	\$0	\$0	-	\$0
<b>Total</b>	<b>\$16,159,034</b>	<b>\$0</b>	<b>\$1,162,349</b>	<b>\$489,664</b>	<b>\$5,615,338</b>	<b>\$32,374</b>	<b>\$2,391,776</b>	<b>\$361,858</b>	<b>\$5,808,986</b>	<b>\$32,021,379</b>

(1) Impacts are discounted at 7 percent and presented in present value terms using 2004 dollars.

(2) Consultation costs include HCP preparation costs. Only total cost is presented as the exact location of some consultations has not been identified.

followed by water consumers and road construction projects. Of the 23 proposed CH units, seven are expected to incur economics cost of greater than \$50 million between 2004 and 2025. Results are further described below.

- **Project modification and administrative costs borne by the real estate sector:**

110 Project modification costs are those costs associated with implementing species and habitat management efforts. These costs include the cost of offsetting compensation (i.e., land set-aside) for impacts to AT habitat. Additionally, project modifications include minimization and avoidance measures to protect the AT while a project is ongoing. Project modification costs resulting from AT conservation activities within CHD are expected to be approximately \$937 million in the future (2004–2025). Additional administrative costs will also be incurred from attending meetings, authoring letters and preparing biological assessments. However, these administrative costs are expected to represent a relatively small component of the total (see **Table ES-5**).

- **The regional significance of land set-aside does not induce market effects:**

120 AT conservation efforts are not expected to affect regional real estate markets or housing prices. Population and employment growth projections suggest that future real estate development is likely to occur in and around proposed CH and EH units. However, the estimated foregone development associated with land set-aside represents a very small fraction of the regional market supply and demand activity. Consequently, the economic costs associated with AT conservation measures are likely to be incurred by individual property owners and/or developers within proposed CH or EH rather than by consumers at large.

130 • **CEQA, delay, and uncertainty, costs borne by the real estate sector:** Future costs associated with CEQA and project delay within CHD are expected to be approximately \$7 million and \$840,000, respectively. CEQA costs are incurred due to the potential for CHD to provide new information to local cities, counties and other agencies, leading them to require developers to complete an Environmental Impact Report for their projects. Additionally, CHD may postpone development where AT-related conservation activities were not anticipated. **Table ES-5** summarizes all estimated impacts borne by the real estate sector.

- **Project modification and administrative costs borne by water consumers:**

140 Project modifications to water supply operations may result in increased water prices for consumers. Modifications may include minimum in-stream flow requirements or maximum allowable flow constraints. Water management changes are estimated to have an upper-bound cost impact of approximately \$47 million in the future. If they occur, these costs are expected to be passed on to water consumers in the form of higher prices.

Table ES-5  
Summary of Future Economic Impacts to Real Estate Development By County (1)  
Economic Analysis of Critical Habitat Designation for the Arroyo Toad

	Land Value Loss		Other Project Modifications		Administrative Costs		CEQA		Delay		Total	
	Critical Habitat	Excluded Habitat	Critical Habitat	Excluded Habitat	Critical Habitat	Excluded Habitat	Critical Habitat	Excluded Habitat	Critical Habitat	Excluded Habitat	Critical Habitat	Excluded Habitat
<b>Monterey</b>	\$0	\$111	\$0	\$66	\$0	\$9	\$0	\$9	\$0	\$0	\$0	\$195
<b>Santa Barbara</b>	\$147,848	\$0	\$352,128	\$0	\$46,360	\$0	\$46,625	\$0	\$177	\$0	\$593,138	\$0
<b>Ventura</b>	\$11,548	\$0	\$1,341	\$0	\$177	\$0	\$387	\$0	\$15	\$0	\$13,468	\$0
<b>Los Angeles</b>	\$33,305,407	\$51,216,825	\$10,231,366	\$16,055,702	\$1,347,039	\$2,113,858	\$1,307,238	\$2,051,656	\$38,548	\$60,422	\$46,229,597	\$71,498,463
<b>Orange</b>	\$64,046,648	\$9,186,720	\$5,295,705	\$980,387	\$697,221	\$129,068	\$904,586	\$129,411	\$79,019	\$10,838	\$71,023,180	\$10,436,424
<b>San Diego</b>	\$756,312,318	\$238,989,964	\$36,190,055	\$13,904,523	\$4,764,703	\$1,981,138	\$4,549,216	\$1,424,358	\$691,662	\$281,945	\$802,507,953	\$256,581,927
<b>San Bernardino</b>	\$24,113,083	\$20,763,837	\$3,692,613	\$3,505,786	\$486,161	\$461,564	\$496,663	\$471,535	\$25,136	\$24,496	\$28,813,657	\$25,227,217
<b>Riverside</b>	\$2,521,843	\$90,943,691	\$351,666	\$3,196,482	\$46,300	\$270,350	\$23,113	\$814,284	\$3,023	\$107,289	\$2,945,945	\$95,332,096
<b>Total</b>	<b>\$880,458,696</b>	<b>\$411,101,147</b>	<b>\$56,114,873</b>	<b>\$37,642,945</b>	<b>\$7,387,960</b>	<b>\$4,955,987</b>	<b>\$7,327,828</b>	<b>\$4,891,254</b>	<b>\$837,580</b>	<b>\$484,990</b>	<b>\$952,126,937</b>	<b>\$459,076,323</b>

(1) Impacts are discounted at 7 percent and presented in present value terms using 2004 dollars.

- 150 • **Project modification and administrative costs borne by US Forest Service (USFS) and ranchers:** Project modifications to grazing activities on Federal lands include habitat surveying and allotment modifications for AT protection. The USFS and ranchers are expected to share the costs. Total future costs are expected to be roughly \$681,000 in addition to administrative costs.
- **Project modification and administrative costs borne by mining claim holders:** AT habitat conservation measures associated with mining activities will include site reclamation as well as habitat avoidance. Future AT habitat conservation costs for mining are estimated at approximately \$568,000. Additional administrative costs are also expected.
- 160 • **Project modification and administrative costs borne by the California Department of Transportation (Caltrans) and other public road development agencies:** Project modifications to road projects include habitat restoration, habitat surveying, and biological monitoring for the AT. Future AT-related costs associated with major public road projects within CHD are estimated at \$4.9 million in addition to administrative costs.
- 170 • **Project modification and administrative costs borne by public agencies and private utilities:** Project modifications to utility and other infrastructure projects include habitat restoration, habitat surveying, and biological monitoring for the AT. Project modification costs associated with utility and other infrastructure projects within CHD are expected to be approximately \$1.8 million in the future. Additional administrative costs are expected.
- **Project modification and administrative costs borne by the Department of Defense:** Marine Corps Base Camp Pendleton, Hunter Liggett Military Reservation, and the Fallbrook Naval Weapons Station have experienced and may continue to experience economic costs associated with AT conservation activities. Future AT-related costs associated with military activities are presented in **Tables ES-2** and **ES-3**. The potential impact on military readiness is beyond the scope of this analysis.

## 180 **Distributional Impacts**

- 190 • **Regional economic impacts related to increases in water costs borne by consumers.** An increase in the price of water may have a ripple effect through the economy by reducing the purchasing power of households and increasing business production costs. The total impact of increased water prices can be estimated using an input/output (I/O) modeling framework developed by the Minnesota IMPLAN Group, Inc. and based on industry data collected by the U.S. Department of Commerce, Bureau of Economic Analysis. An I/O model traces the linkages between various sectors of a regional economy to determine potential change in employment brought about by given change in the demand for goods and services.



- The estimated upper-bound increase in water prices has the potential to result in a total of 82 lost jobs and \$10.2 million in reduced output over the five counties with reservoirs affecting AT habitat. This calculation assumes that the total cost impacts are passed on to local consumers in the form of higher water prices.
- **Impacts to small business may occur.** Small entities potentially affected by AT conservation activities include land developers, cattle ranchers, and farmers. With the exception of land developers in San Diego, Riverside and Orange Counties, impacts to affected small businesses are expected to represent less than 10 percent of their annual sales. In addition, only a very small proportion of the total number of small businesses in each sector is likely to be affected.
- **Energy Industry Impacts.** Pursuant to Executive order No. 13211, Federal agencies are required to submit a summary of the potential effects of regulatory actions on the supply, distribution and use of energy. This proposed CHD is not expected to generate any “significant adverse effects” as defined by the Office of Management and Budget.

## CAVEATS TO THE ECONOMIC ANALYSIS

- 210 **Table ES-6** presents several key assumptions that introduce uncertainty into the economic analysis. In addition, **Table ES-6** describes the expected direction of bias introduced by the assumption.

## ORGANIZATION OF THE REPORT

- 220 This report contains seven chapters. **Chapter I** presents the analytic framework of the analysis, including a discussion of the types of economic impacts that are estimated, the time frame of the analysis, and a summary of the analytic steps comprising the analysis. **Chapter II** provides background on the designation, the species and its habitat, and major regulations that govern land use impacts to the habitat. **Chapter III** describes the economic analysis of impacts on real estate development. **Chapter IV** covers upper-bound economic impacts of AT conservation efforts on water supply. **Chapter V** reports economic impacts on other private activities. **Chapter VI** presents economic impacts on public projects. **Chapter VII** presents additional economic impacts.

<b>Table ES-6</b> <b>Caveats to the Economic Analysis</b> <b>Economic Analysis of CHD for the Arroyo Toad</b>	
<b>Key Assumption</b>	<b>Effect on Impact Estimate</b>
The analysis does not account for the habitat preserved for reasons unrelated to the AT or at a point in time before its listing. Land use regulations intended to protect the habitat of other species may have generated habitat purchases independent of AT protections or prior to its listing.	-
The analysis does not assume that developers may satisfy multiple public land use requirements by setting aside AT habitat on the project site. In reality, projects benefit from claiming that habitat protection provides open space, necessary buffering between incompatible land uses, flood control, and other functions. The use of habitat land in this way reduces the project's required dedication of land for other open space uses compared to a land use plan in which no habitat set-aside is required.	-
The rate of change in the price of land may not be uniform across the study area, and real rates of increase during the next 20 years may be above or below the level used in the calculations.	+/-
The quantity and location of development over the next 20 years may produce less than 100 percent buildout of areas planned for development. General plan designations and existing land use data are not perfect indicators of developable land. In many cases, planned land uses can overstate the amount of development that is achievable.	-
The estimated water supply impacts rely on a variety of assumptions about the scope and location of future consultations between the Service and water managers. In addition, the actual implications of the consultations on water supply will depend on a variety hydrologic, infrastructure, and economic factors that are difficult to predict at this time, especially given the lack of a consultation history on this activity. The economic costs provided herein are an upper-bound estimate; actual impact may vary significantly given the level of uncertainty involved.	+/-
The analysis utilizes the best available existing data. However, estimates of impacts from unidentified projects may be missing.	+
The analysis assumes that all CH units are occupied by AT. In reality, however, not every acre in CH contains the AT or the primary constituent elements of habitat. Economic costs may be avoided if projects are undertaken in CH but neither AT nor constituent elements are present.	-
-: Modifying the analysis to reflect the presented information would lower the estimated costs. +: Modifying the analysis to reflect the presented information would raise the estimated costs. +/-: This assumption has an unknown effect on estimates.	

# I. REPORT BACKGROUND AND ANALYTICAL FRAMEWORK

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## REPORT BACKGROUND AND PURPOSE

230 In April 2004, the U.S. Fish and Wildlife Service (Service) proposed to designate approximately 138,713 acres of critical habitat (CH) in Monterey, Santa Barbara, Ventura, Los Angeles, Orange, San Diego, Riverside, and San Bernardino Counties in the State of California for the arroyo toad (*Bufo Californicus* or AT).<sup>4</sup> Another 37,842 acres of essential habitat were proposed for exclusion from this designation. Together, the lands proposed for designation and lands excluded from the designation total 176,555 acres of essential habitat for the AT.

240 In the Notice of Availability (NOA) for this report, the Service revises the April 2004 proposed designation (referred to as the 2005 reproposal). As described in the NOA, the revisions reduce the total acreage proposed for critical habitat designation (CHD) to 95,544 acres and increase the amount of essential habitat proposed for exclusion to 39,815 acres.<sup>5</sup> This Final Report presents estimated economic impacts based on the 2005 reproposal.

The purpose of this analysis is to estimate the economic impact of actions taken to protect the federally listed AT and its habitat. It attempts to quantify the economic effects of CHD, as well as any protective measures taken as a result of the listing or other Federal, State, and local laws that aid habitat conservation in the areas proposed for designation or exclusion. It looks retrospectively at costs that have been incurred since the date the species was listed, and it attempts to predict future costs likely to occur after the designation is finalized.

250 Section 4(b)(2) of the Endangered Species Act (ESA) requires the Service to designate CH on the basis of the best scientific data available, after taking into consideration the economic impact, and any other relevant impact, of specifying any particular area as CH. The Service may exclude areas from CHD when the benefits of exclusion outweigh the benefits of including the areas within CH, provided the exclusion will not result in the extinction of the species.

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<sup>4</sup> The AT was listed as an endangered species on December 16, 1994 and CH was first designated for the AT in February 2001. The original CHD was remanded in October 2002 (*Building Industry Legal Defense Foundation, et al., v. Gale Norton, Secretary of the Interior, et al., and Center for Biological Diversity, Inc. and Defenders of Wildlife, Inc.* Civil Action No. 01-2311 (JDB) (U.S. District Court, District of Columbia)).

<sup>5</sup> The 2005 reproposal does not propose designation in any new areas.

260 This information is intended to assist the Secretary of the Interior (the Secretary) in determining whether the benefits of excluding particular areas from the designation outweigh the benefits of including those areas in the designation.<sup>6</sup> In addition, this information allows the Service to address the requirements of Executive Orders 12866 and 13211, and the Regulatory Flexibility Act (RFA), as amended by the Small Business Regulatory Enforcement Fairness Act (SBREFA).<sup>7</sup> This report also complies with direction from the U.S. 10<sup>th</sup> Circuit Court of Appeals that, when deciding which areas to designate as CH, the economic analysis informing that decision should include “co-extensive” effects.<sup>8</sup>

## **SPECIES AND HABITAT DESCRIPTION**

270 The AT is a small, dark-spotted toad found in coastal and desert drainages from Monterey County, California, south into northwestern Baja California, Mexico. It favors shallow pools and open sand and gravel channels along low-gradient reaches of medium- to large-sized streams for breeding. In addition, the AT requires upland habitats adjacent to breeding locations. The AT typically burrows underground during periods of inactivity. Although the habitat use patterns of this species are not completely understood, activity is thought to be concentrated in alluvial flats (areas created when sediments from the stream are deposited) and sandy terraces found in valley bottoms of currently active drainages.<sup>9</sup>

## **APPROACH TO ESTIMATING ECONOMIC EFFECTS**

280 This economic analysis considers both the economic efficiency and distributional effects that may result from efforts to protect the AT and its habitat (hereinafter referred to collectively as “AT conservation activities”). Economic efficiency effects generally reflect “opportunity costs” associated with the commitment of resources required to accomplish species and habitat conservation. For example, if activities that can take place on a parcel of private land are limited as a result of the designation or the presence of the species, and thus the market value of the land is reduced, this reduction in value represents one measure of opportunity cost or change in economic efficiency. Similarly, the costs incurred by the regulated community to consult with the Service under section 7 represent opportunity costs of AT conservation activities.

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<sup>6</sup> 16 U.S.C. §1533(b)(2).

<sup>7</sup> Executive Order 12866, “Regulatory Planning and Review,” September 30, 1993; Executive Order 13211, “Actions Concerning Regulations That Significantly Affect Energy Supply, Distribution, or Use,” May 18, 2001; 5 U.S.C. §§601 *et seq*; and Pub Law No. 104-121.

<sup>8</sup> In 2001, the U.S. 10<sup>th</sup> Circuit Court of Appeals instructed the Service to conduct a full analysis of all of the economic impacts of proposed CHD, regardless of whether those impacts are attributable co-extensively to other causes (*New Mexico Cattle Growers Ass’n v. U.S.F.W.S.*, 248 F.3d 1277 (10<sup>th</sup> Cir. 2001)).

<sup>9</sup> Endangered and Threatened Wildlife and Plants; Proposed Designation of Critical Habitat for the Arroyo Toad (Unpublished draft). Fish and Wildlife Service, Interior. 2004.

This analysis also addresses how the impacts of AT conservation activities are distributed, including an assessment of any local or regional impacts of conservation activities and the potential effects of conservation activities on small entities and the energy industry. This information can be used by decision-makers to assess whether the effects of conservation activities might unduly burden a particular group or economic sector.

For example, while habitat conservation activities may have a relatively small impact when measured in terms of changes in national economic efficiency, individuals employed in a particular sector of the economy in the geographic area of the designation may experience relatively greater impacts. The difference between economic efficiency effects and distributional effects, as well as their application in this analysis, are discussed in greater detail below.

This analysis also endeavors to capture the net economic impact imposed on regulated entities and the regional economy resulting from AT conservation efforts. To the extent possible, the estimated net economic impact should account for any offsetting benefits that might accrue to the regulated community due to their AT habitat preservation activities. For example, in certain cases real estate development that effectively incorporates AT habitat set-aside on site might realize a value premium typically associated with additional open space. Any such premium will offset land preservation costs borne by landowners/developers. Reliable data revealing the premium that the market places on nearby open space in Southern California are not readily available. However, it is likely that any such value is limited given the nature of lands being set aside for habitat.

## EFFICIENCY EFFECTS

At the guidance of the Office of Management and Budget (OMB) and in compliance with Executive Order 12866 “Regulatory Planning and Review,” Federal agencies measure changes in economic efficiency in order to understand how society, as a whole, will be affected by a regulatory action.<sup>10</sup> In the context of regulations that protect AT habitat, these efficiency effects represent the opportunity cost of resources used or benefits foregone by society as a result of the regulations. Economists generally characterize opportunity costs in terms of changes in producer and consumer surpluses in affected markets.<sup>11</sup>

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<sup>10</sup> Executive Order 12866, “Regulatory Planning and Review,” September 30, 1993; U.S. Office of Management and Budget, “Circular A-4,” September 17, 2003, available at <http://www.whitehouse.gov/omb/circulars/a004/a-4.pdf>.

<sup>11</sup> Consumer surplus is the difference between the total value consumers receive from a particular good and the total amount they pay for that good. Producer surplus, alternatively, is the difference between the total market value associated with a particular level of output and the total market costs associated with supplying that level of output. For additional information on the definition of “surplus” and an explanation of consumer and producer surplus in the context of regulatory analysis, see Gramlich, Edward M., *A Guide*

In some instances, compliance costs may provide a reasonable approximation for the efficiency effects associated with a regulatory action. For example, a landowner or manager may enter into a consultation with the Service to ensure that a particular activity will not adversely modify CH. The effort required for the consultation represents an economic opportunity cost, because the landowner or manager's time and effort would have been spent in an alternative activity had the parcel not been included in the designation. When compliance activity is not expected to significantly affect markets—that is, not result in a shift in the quantity of a good or service provided at a given price, or in the quantity of a good or service demanded given a change in price—  
330 the measurement of compliance costs can provide a reasonable estimate of the change in economic efficiency.

Where AT conservation activities are expected to significantly impact a market, it may be necessary to estimate changes in producer and consumer surpluses. For example, a designation that precludes the development of large areas of land may shift the price and quantity of housing supplied in a region. In this case, changes in economic efficiency (i.e., social welfare) can be measured by considering changes in producer and consumer surplus in the real estate market.

340 This analysis begins by measuring costs associated with measures taken to protect species and habitat. As noted above, in some cases, compliance costs can provide a reasonable estimate of changes in economic efficiency. However, when the cost of conservation measures is expected to significantly impact markets, the analysis considers potential changes in consumer and/or producer surplus in affected markets.

## DISTRIBUTIONAL AND REGIONAL ECONOMIC EFFECTS

Measurements of changes in economic efficiency focus on the net impact of conservation activities, without consideration of how certain economic sectors or groups of people are affected. Thus, a discussion of efficiency effects alone may miss important distributional considerations. OMB encourages Federal agencies to consider distributional effects  
350 separately from efficiency effects.<sup>12</sup> This analysis considers several types of distributional effects, including impacts on small entities; impacts on energy supply, distribution, and use; and regional economic impacts. It is important to note that these are fundamentally different measures of economic impact than efficiency effects, and thus cannot be added to or compared with estimates of changes in economic efficiency.

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to *Benefit-Cost Analysis* (2<sup>nd</sup> Ed.), Prospect Heights, Illinois: Waveland Press, Inc., 1990; and U.S. 240-R-00-003, September 2000, available at <http://yosemite.epa.gov/ee/epa/eed.nsf/webpages/Guidelines.html>.

<sup>12</sup> U.S. Office of Management and Budget, "Circular A-4," September 17, 2003, available at <http://www.whitehouse.gov/omb/circulars/a004/a-4.pdf>.

### **Impacts on Small Entities and Energy Supply, Distribution, and Use**

This analysis considers how small entities, including small businesses, organizations, and governments, as defined by the RFA, might be affected by proposed CHD.<sup>13</sup> In addition, in response to Executive Order 13211 “Actions Concerning Regulations That Significantly Affect Energy Supply, Distribution, or Use,” this analysis considers the impacts of CH on the energy industry and its customers.<sup>14</sup>

### **Regional Economic Effects**

Regional economic impact analysis can provide an assessment of the potential localized effects of conservation activities. Specifically, regional economic impact analysis produces a quantitative estimate of the potential magnitude of the initial change in the regional economy resulting from a regulatory action. Regional economic impacts are commonly measured using regional I/O models. These models rely on multipliers that mathematically represent the relationship between a change in one sector of the economy (e.g., expenditures by households) and the effect of that change on economic output, income, or employment in other local industries (e.g., suppliers of goods and services to households). These economic data provide a quantitative estimate of the magnitude of shifts of jobs and revenues in the local economy.

The use of regional I/O models in an analysis of the impacts of species and habitat conservation efforts can overstate the long-term impacts of a regulatory change. Most importantly, these models provide a static view of the economy of a region. That is, they measure the initial impact of a regulatory change on an economy but do not consider long-term adjustments that the economy will make in response to this change. For example, these models provide estimates of the number of jobs lost as a result of a regulatory change, but do not consider re-employment of these individuals over time or other adaptive responses by impacted businesses. In addition, the flow of goods and services across the regional boundaries defined in the model may change as a result of the regulation, compensating for a potential decrease in economic activity in the region.

Despite these and other limitations, in certain circumstances regional economic impact analysis may provide useful information about the scale and scope of localized impacts. It is important to remember that measures of regional economic effects generally reflect shifts in resource use rather than efficiency losses. Thus, these types of distributional effects are reported separately from efficiency effects (i.e., not summed). In addition, measures of regional economic impact cannot be compared with estimates of efficiency effects, but should be considered as distinct measures of impact.

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<sup>13</sup> 5 U.S.C. § 601 *et seq.*

<sup>14</sup> Executive Order 13211, “Actions Concerning Regulations That Significantly Affect Energy Supply, Distribution, or Use,” May 18, 2001.

## SCOPE OF THE ANALYSIS

This analysis attempts to quantify economic effects of CHD, as well as any protective measures taken as a result of the listing or other Federal, State, and local laws that aid habitat conservation in the areas proposed for designation. Habitat protection efforts undertaken to meet the requirements of other Federal, State, or local agencies can assist the Service in achieving its goals as set out in section 4(b)(2) of the Act (already defined in the previous section). In certain cases, other government entities may work cooperatively with the Service to address natural resource management issues, thereby expediting the regulatory process for project proponents. Because all AT-related species and habitat protection efforts likely contribute to the efficacy of the proposed AT CHD efforts, the impacts of these actions are considered relevant for understanding the full impact of proposed CHD.

## SECTIONS OF THE ACT RELEVANT TO THE ANALYSIS

The analysis focuses on activities that are influenced by the Service through sections 4, 7, 9, and 10 of the ESA. Section 4 of the Act focuses on the listing and recovery of endangered and threatened species, as well as CHD. In this section, the Secretary is required to designate species as endangered or threatened “solely on the basis of the best available scientific and commercial data.”<sup>15</sup> Under section 4(d), the Service writes regulations to provide for the conservation of threatened species. The implementation of these regulations may have economic impacts on resource managers, landowners, and other relevant parties. Impacts associated with section 4(d) are considered in this analysis.

The protections afforded to threatened and endangered species and their designated habitat are described in sections 7, 9, and 10 of the Act, and economic impacts resulting from these protections are the focus of this analysis:

- Section 7 of the Act requires Federal agencies to consult with the Service to ensure that any action authorized, funded, or carried out will not likely jeopardize the continued existence of any endangered or threatened species or result in the destruction or adverse modification of CH. The administrative costs of these consultations, along with the costs of project modifications resulting from these consultations, represent compliance costs associated with the listing of the species and CHD.<sup>16</sup>

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<sup>15</sup> 16 U.S.C. 1533.

<sup>16</sup> The Service notes that a recent Ninth Circuit judicial opinion, *Gifford Pinchot Task Force v. United States Fish and Wildlife Service*, has invalidated the Service's regulation defining destruction or adverse modification of critical habitat. The Service is currently reviewing the decision to determine what effect it (and to a limited extent *Center for Biological Diversity v. Bureau of Land Management* (Case No. C-03-2509-SI, N.D. Cal.)) may have on the outcome of consultations pursuant to section 7 of the Act.



- Section 9 defines the actions that are prohibited by the Act. In particular, it prohibits the “take” of endangered wildlife, where “take” means to “harass, harm, pursue, or collect, or to attempt to engage in any such conduct.”<sup>17</sup> The economic impacts associated with this section manifest themselves in sections 7 and 10.
- Under section 10(a)(1)(B) of the Act, a non-Federal entity (e.g., a landowner or local government) may develop a habitat conservation plan (HCP) for an endangered animal species in order to meet the conditions for issuance of an incidental take permit in connection with the development and management of a property.<sup>18</sup> The requirements posed by the HCP may have economic impacts associated with the goal of ensuring that the effects of incidental take are adequately minimized and mitigated. Federal agencies do not develop HCPs, but instead obtain permission for incidental take through the section 7 consultation process.

The areas covered by AT habitat proposed for exclusion includes a number of regional HCPs. These include the San Diego Multiple Species Conservation Program (MSCP), the Orange County Central-Coastal Natural Community Conservation Planning (NCCP) program/HCP, the Western Riverside Multiple Species Habitat conservation Plan (MSHCP) and the San Diego Gas and Electric NCCP/HCP. The economic costs associated with these HCPs are evaluated in **Chapter VI** of this report.

## OTHER RELEVANT REGULATIONS AND PROTECTION EFFORTS

The protection of listed species and habitat is not limited to the Act. Other Federal agencies, as well as State and local governments, may also seek to protect the natural resources under their jurisdiction.<sup>19</sup> In general, economic impacts will be evaluated regardless of whether or not species protection measures required by the Act are also required by other Federal agencies or State and local governments. The impact of these protection measures will be treated as “co-extensive” with or attributable to AT listing

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<sup>17</sup> 16 U.S.C. 1538 and 16 U.S.C. 1532.

<sup>18</sup> U.S. Fish and Wildlife Service, “Endangered Species and Habitat Conservation Planning.” From: <http://endangered.fws.gov/hcp/>, as viewed on August 6, 2002. Sections 9 and 10 of the Act do not apply to plants.

<sup>19</sup>For example, the Sikes Act Improvement Act (Sikes Act) of 1997 requires Department of Defense (DoD) military installations to develop Integrated Natural Resources Management Plans (INRMPs) that provide for the conservation, protection, and management of wildlife resources (16 U.S.C. §§ 670a—670o). These plans must integrate natural resource management with the other activities, such as training exercises, taking place at the facility. Zoning laws in the State of Hawai’i limit land uses in areas designated by the State as Conservation Districts. The purpose of a Conservation District in Hawai’i is to conserve, protect, and preserve the State’s natural resources through appropriate management in order to protect the long-term sustainability of natural resources (Hawaii Revised Statutes, § 183 C-3).

and designation. Examples of the type of regulations that fall into this category include, but are not limited to, the California Environmental Quality Act (CEQA) and Section 404 of the Clean Water Act.

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In some cases, non-habitat-related regulations will limit land use activities within CH in ways that will directly or indirectly benefit the AT or its habitat. For example, local zoning ordinances that specify the amount and type of development that may occur, if any, in a certain area may benefit the AT and its habitat. The impact of these types of local, non-habitat-related regulations and land use controls are not considered as “co-extensive” with or attributable to the AT listing and designation. Examples of these types of local regulations or controls include, but are not limited to, local zoning ordinances, local hillside of view shed protection ordinances, local streambed alteration or preservation requirements, and floodway development restrictions.

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## ADDITIONAL ANALYTICAL CONSIDERATIONS

This analysis also considers other types of economic impacts that can be a consequence of AT CHD. These may include loss in project value due to stigma, uncertainty, and project delay, as described further below.

### **Stigma**

Stigma refers to the change in economic value of a particular project or activity due negative (or positive) perceptions of the role CH will play in developing, implementing, or conducting the activity. For example, changes to private property values associated with developer attitudes about the limits and costs of implementing a project in CH are referred to as “stigma” impacts.

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### **Time Delay and Regulatory Uncertainty**

Uncertainty and delay represent actual (as opposed to perceived) impacts due to additional risk with regard to the amount, timing, or cost associated with a project or activity. For example, time delays can be caused by the consultation process or compliance with other regulations. Regulatory uncertainty costs can occur in anticipation of having to modify project parameters (e.g., retaining outside experts or legal counsel to better understand their responsibilities with regard to CH).

### **Other Impacts**

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Under certain circumstances, CHD may provide new information to a community about the sensitive ecological nature of a geographic region, potentially triggering additional economic impacts under other State or local laws. In cases where these costs would not have been triggered “but for” CHD, they are included in this economic analysis. In this regard, the analysis considers the extent to which the AT designation might trigger an Environmental Impact Report under CEQA.

## BENEFITS

The published economics literature has documented that real social welfare benefits can result from the conservation and recovery of endangered and threatened species. These benefits may not be solely attributable to CH; such benefits have also been ascribed to preservation of open space and biodiversity, both of which are associated with the species conservation. Likewise, regional economies and communities can benefit from the preservation of healthy populations of endangered and threatened species, and the habitat on which these species depend.

In Executive Order 12866, OMB directs Federal agencies to provide an assessment of costs and benefits of a proposed regulatory action.<sup>20</sup> However, in its guidance for implementing Executive Order 12866, OMB acknowledges that often, it may not be feasible to monetize, or even quantify, the benefits of environmental regulations.<sup>21</sup> Where benefits cannot be quantified, OMB directs agencies to describe the benefits of a proposed regulation qualitatively. *Given the limitations associated with estimating the benefits of proposed CHD for the AT, the Service believes that the benefits of proposed CHD are best expressed in biological terms that can be weighed against the expected cost impacts of the rulemaking.*

## ANALYTIC TIME FRAME

The analysis looks prospectively at future costs associated with the listing, CH, and other related AT protections. The analysis examines economic impacts based on activities that are “reasonably foreseeable,” including but not limited to activities that are currently authorized, permitted, or funded, or for which proposed plans are currently available to the public. Additionally, the analysis looks retrospectively at all costs that have occurred since the time that the AT listing was finalized in December, 1994. Accordingly, the analysis bases estimates on activities that span the 1994 to 2025 time frame. The year 2025 is the latest period for which local projections of growth and development in the areas encompassing CH are available.

## INFORMATION SOURCES

This analysis relies on data and information from a wide variety of sources. Communications with and data provided by personnel from the Service, including maps, biological opinions (BOs), and other material directly related to the proposed designation, provide one source of information. Information was also obtained from a variety of other Federal,

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<sup>20</sup> Executive Order 12866, “Regulatory Planning and Review,” September 30, 1993.

<sup>21</sup> U.S. Office of Management and Budget, “Circular A-4,” September 17, 2003, available at <http://www.whitehouse.gov/omb/circulars/a004/a-4.pdf>.

530 State, and local agencies, as well as independent or private sector entities and individuals. The range of entities that provided data and information for this analysis include, but are not limited to, the following:

- Southern California Association of Governments, San Diego Association of Governments, Santa Barbara Association of Governments, and Monterey Association of Governments; and
- The California Department of Transportation.

540 The report provides citations where appropriate.

## II. ECONOMIC IMPACT TO REAL ESTATE DEVELOPMENT

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This chapter evaluates how actions taken to protect the AT and its habitat may affect real estate development activities and markets in AT essential habitat. Specifically, it focuses on the past and future effect of the Act and any “co-extensive” habitat-based land use regulations on the supply and demand for land used in residential and commercial real estate development within proposed AT CH and excluded essential habitat (EH).

550 An overview of our general methodology and approach for evaluating the economic impact of AT protection on private development is provided below, followed by a presentation of the analysis and estimated total economic costs. An overview of the estimated economic costs described in this chapter appears in **Table 1**.

### ANALYTICAL APPROACH

Potential modifications to land use projects stemming from AT protection can affect landowners, consumers, and real estate markets in general. The total economic impact will depend on the scope of AT conservation activities, pre-existing land use and regulatory controls in the region, and the nature of regional land and real estate markets. In order to accurately account for all of these factors, and to estimate the corresponding economic impacts, this evaluation employs a series of methodological tasks as described below.<sup>22</sup>

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#### 1. Determine Overlap between Proposed CH/EH and Projected Land Development

The first step in evaluating the effect of AT protection on private land development is to identify the amount, type and location of land included in the proposed designation. The effect on private development stems from projects on land within CH/EH that can be feasibly developed during the time frame being considered. To isolate potentially impacted areas, the analysis excludes non-developable areas such as bodies of water, parks and urbanized areas from CH and EH. Geographically-based development projections are then used to estimate the amount of future growth (residential, commercial, etc.) expected to occur on developable acreage within proposed CH and EH boundaries.

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#### 2. Identify Off-setting Compensation Associated with AT Protection

The actual effects of AT conservation activities on land value will ultimately depend on the type and level of project modifications for the AT. The section 7 consultation history is used to ascertain the type of AT conservation activities that are likely to occur in the

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<sup>22</sup> The steps described below outline the methodological approach used to estimate the economic impacts associated with future land development in CH and EH; the economic impact of historical AT-related project modifications are based on past section 7 consultations and HCP activities, as described in later sections.

**Table 1**  
**Summary of Estimated Economic Impacts (1)**  
**Economic Analysis of Critical Habitat Designation for the Arroyo Toad**

CH/EH Unit	Loss in Land Value		Other Project Modifications		Total Cost (2)	
	Critical Habitat	Excluded Habitat	Critical Habitat	Excluded Habitat	Critical Habitat	Excluded Habitat
1	--	\$111	--	\$66	--	\$177
2	\$146,619	--	\$349,199	--	\$495,818	--
3	\$1,229	--	\$2,928	--	\$4,158	--
4	\$5,741	--	\$1,303	--	\$7,044	--
5	\$359,193	--	\$110,044	--	\$469,238	--
6	\$12,598,254	\$51,216,825	\$3,879,780	\$16,055,702	\$16,478,034	\$67,272,527
7	\$20,353,767	--	\$6,241,580	--	\$26,595,346	--
8	\$1,668,197	\$9,173,091	\$178,270	\$980,333	\$1,846,467	\$10,153,424
9	\$844	\$29,330,500	\$58	\$2,053,428	\$902	\$31,383,928
10	\$48,358,170	\$0	\$5,198,350	\$0	\$53,556,520	\$0
11	\$14,020,363	\$13,629	\$1,486,025	\$1,445	\$15,506,387	\$15,073
12	\$38,003,844	\$27,244	\$1,728,770	\$1,240	\$39,732,614	\$28,484
13	\$31,884,381	\$61,613,190	\$1,459,013	\$4,146,875	\$33,343,394	\$65,760,065
14	\$127,845,601	\$38,002	\$5,792,237	\$1,726	\$133,637,837	\$39,729
15	\$76,186,729	--	\$3,466,140	--	\$79,652,869	--
16	\$160,572,555	\$63,792,620	\$7,308,599	\$2,882,150	\$167,881,154	\$66,674,771
17	\$38,729,526	\$95,170,891	\$1,765,060	\$4,374,910	\$40,494,586	\$99,545,801
18	\$90,231,818	\$27,700,672	\$4,106,759	\$1,260,937	\$94,338,577	\$28,961,609
19	\$193,246,423	\$52,260,535	\$8,781,053	\$2,378,347	\$202,027,475	\$54,638,882
20	\$2,404,742	--	\$417,266	--	\$2,822,008	--
21	\$0	--	\$0	--	\$0	--
22	\$21,708,341	\$20,763,837	\$3,692,613	\$3,505,786	\$25,400,954	\$24,269,623
23	\$2,132,360	--	\$149,828	--	\$2,282,188	--
<b>Future Costs</b>	<b>\$880,458,696</b>	<b>\$411,101,147</b>	<b>\$56,114,873</b>	<b>\$37,642,945</b>	<b>\$936,573,569</b>	<b>\$448,744,092</b>
<b>Historical Costs</b>	<b>\$15,009,774</b>	<b>--</b>	<b>\$1,149,261</b>	<b>--</b>	<b>\$16,159,034</b>	<b>--</b>
<b>Total</b>	<b>\$895,468,469</b>	<b>\$411,101,147</b>	<b>\$57,264,134</b>	<b>\$37,642,945</b>	<b>\$952,732,603</b>	<b>\$448,744,092</b>

(1) Impacts are discounted at 7 percent and presented in present value terms using 2004 dollars.

(2) Total cost presented does not include administrative costs, CEQA costs, delay costs or uncertainty costs.

580 future. Thus, the second step is to estimate the expected modifications to land use projects associated with section 7 and other co-extensive habitat-based land use regulations, including habitat restoration, land set-aside, and measures to avoid or minimize impacts to the AT. This step includes the subtraction of land that is likely to have been set aside independent of habitat-based regulations (e.g., due to flood risks, topography, geology, project configuration, etc.). Requirements associated with pre-existing regulations or land use restrictions, including Federal, State, local, or regional laws and agreements, that are co-extensive with AT protection under section 7 have not been excluded.

### **3. Evaluate Effects on Regional Real Estate Market and Associated Cost Incidence**

590 The third step is to determine the significance of AT-related land use project modifications relative to regional real estate demand and supply dynamics, and the resulting regulatory cost incidence. The incidence or burden of the project modification and other compliance costs will ultimately depend on their scope and the nature of the regional real estate markets.

The economic impacts are likely to extend beyond the regulated landowners and affect the real estate market, real estate consumers, and the regional economy if (1) the amount of land set-aside (i.e., not developed as a result of AT protection) is high relative to the  
600 total developable land in the region, and/or (2) other compliance costs are high relative to real estate development value and cover a significant proportion of developable land. In these cases, landowners and developers may pass on the costs to real estate consumers in the form of higher prices.

Conversely, if project modification costs are low and/or AT protection only affects a small fraction of the total developable land supply in a region, then the economic effects are likely to be limited to that sub-set of individual landowners and/or projects. In this case, the regulated landowners will not be able to pass on their increased costs to  
610 consumers and their development projects will either relocate to other available sites or proceed with a reduced land value.

### **4. Estimate Economic Impacts**

The fourth step involves taking the data and conclusions from steps one through three and estimating the potential economic costs associated with AT protection. The approach to economic cost estimation is different depending on the cost incidence. If the project modification requirements do not affect the overall regional real estate market dynamics, cost impacts are borne by the regulated landowners and reduced land values are estimated. The economic costs are estimated based on the loss in land value  
620 associated with required on-site set-asides, increased mitigation costs, and other project modifications incurred by individual landowners/developers.

If, however, the scale and intensity of the proposed designation is sufficient to affect regional real estate dynamics, regulatory requirements will primarily affect consumers through some mix of increased real estate prices and reduced real estate production. Producers or landowners will also be affected, although those with land outside of the designation area could gain from the reduced supply and corresponding price increase. The total economic effect is measured through the change in producer and consumer surplus, a measure of social welfare.<sup>23</sup> The potential distribution of economic impacts is summarized in **Table 2**.

## ESTIMATE OF AFFECTED ACREAGE

Following the methodology outlined above, this section estimates the number of acres of projected development within proposed CH/EH likely to be impacted by AT conservation activities. This calculation starts with the total number of acres within the proposed CH/EH area and deducts from this the amount of land that is unlikely to be affected by AT conservation measures (i.e., it would not be developed in any case). A summary of this calculation is provided in **Table 3** and further described below.

## PRIMARY DATA AND TIME HORIZON

The estimated number of acres of private development potentially affected by CH/EH is based on the proposed designation boundary maps provided by the Service and on regional development projections by census tract. Specifically, Geographic Information Systems (GIS) maps of the proposed CH/EH boundaries were correlated with census-tract-level land use data provided by the Southern California Association of Governments (SCAG), the San Diego Association of Governments (SANDAG), and the U.S. Census Bureau.

SCAG and SANDAG are quasi-governmental agencies responsible for providing official demographic projections for (a) Los Angeles, Ventura, Riverside, San Bernardino, and Orange counties and (b) San Diego County, respectively. The regional agencies responsible for demographic projections in Santa Barbara and Monterey counties (the Santa Barbara County Association of Governments [SBCAG] and the Association of Monterey Bay Area Governments [AMBAG], respectively) do not develop land use projections on a census tract basis. Rates of historical census tract growth based on 1990 and 2000 Census data were therefore used to estimate future development by census tract in these counties.

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<sup>23</sup> Consumer surplus is the difference between the total value consumers receive from a particular good and the total amount they pay for that good. When the price of a good goes up, consumer surplus falls (assuming no shift in demand) since a portion of the consumers fall out of the market altogether and the remainder pay a higher price. Producer surplus, alternatively, is the difference between the total market value associated with a particular level of output and the total market costs associated with supplying that level of output.



**Table 2**  
**Distributional Impacts of CHD by Location and Affected Party**  
**Economic Analysis of Critical Habitat Designation for the Arroyo Toad**

Affected Party	Cost Distribution w/out Market-wide Impacts (1)		Cost Distribution with Market-wide Impacts (2)	
	Inside CH	Outside CH	Inside CH	Outside CH
<b>Renters</b>	No Impact	No Impact	Negative Impact	Negative Impact
<b>Existing Home-owners / Landlords</b>	No Impact	No Impact	Positive Impact	Positive Impact
<b>Future Home-buyers / Landlords</b>	No Impact	No Impact	Negative Impact	Negative Impact
<b>Existing Land-owners</b>	Negative Impact	No Impact	Negative Impact	Positive Impact
<b>Future Land-owners / Developers</b>	No Impact	No Impact	No Impact	No Impact

(1) Assumes that CH requirements affect only a very small component of total supply, resulting in no increase market land prices.

(2) Assumes that CH requirements affect a significant component of total supply, resulting in an increase market land prices.

**Table 3**  
**Summary of Land Development Projections**  
**Economic Analysis of Critical Habitat Designation for the Arroyo Toad**

CH/EH Unit	Proposed Designation (Acres) (1)		Developable Acres (2)		Projected Development (Acres) (3)	
	Critical Habitat	Excluded Habitat (4)	Critical Habitat	Excluded Habitat	Critical Habitat	Excluded Habitat
1	-	6,839	0	13	0	0
2	5,534	-	2,992	0	2	0
3	4,398	-	512	0	0	0
4	4,129	-	549	0	0	0
5	3,959	-	590	0	4	0
6	2,290	3,971	1,391	3,490	139	577
7	4,087	-	1,406	0	224	0
8	172	1,227	159	1,227	19	107
9	683	2,515	3	2,087	0	444
10	5,635	7	2,529	0	565	0
11	4,016	4,432	1,403	0	161	0
12	1,741	7,921	1,388	0	392	0
13	2,523	5,728	1,911	5,412	331	897
14	8,761	2	6,862	2	1,315	0
15	6,195	-	4,581	0	787	0
16	7,982	4,831	7,289	4,499	1,659	654
17	2,051	3,723	1,441	3,542	401	993
18	7,804	931	3,858	868	932	286
19	12,611	1,660	6,383	1,640	1,993	540
20	1,258	-	653	0	38	0
21	941	-	0	0	0	0
22	6,821	2,576	2,157	2,176	334	317
23	1,952	-	905	0	32	0
<b>Total</b>	<b>95,544</b>	<b>46,363</b>	<b>48,962</b>	<b>24,955</b>	<b>9,330</b>	<b>4,815</b>

(1) Based on GIS data provided by the Service.

(2) Based on GIS analysis, total CH/EH acres minus undevelopable areas such as parks, waterways and existing development.

(3) Based on information from regional forecasting entities (e.g. SCAG, SANDAG, MCAG, and SBCAG) and the US Census.

(4) Based on April 2004 GIS data.

660 The time frame for this analysis is 2025, which corresponds with the time frame for the regional demographic and economic projections provided by SCAG (rather than 2030 as provided by SANDAG). Because EPS does not have adequate data to provide reliable forecasts beyond 2025 for seven out of the eight counties included in this analysis, the SCAG time horizon was deemed most appropriate. The land use projections are calculated as undeveloped acres slated for residential, retail, office, or industrial development. SANDAG provides acreage estimates for these land use categories while SCAG data were converted to an acreage format based on assumptions regarding employees and households per acre. Census-based projections of future household growth were converted to residential land development estimates based on a household-per-acre factor for Santa Barbara and Monterey counties.

## POTENTIAL DEVELOPMENT IN CRITICAL AND ESSENTIAL HABITAT

670 Prior to screening which census tracts intersect with proposed CH, land areas identified as parks, permanent open space, open water, and/or other publicly owned areas are removed from the analysis of private real estate development. This analysis assumes future private development will not occur in these areas. As shown in **Table 3**, approximately 49,000 acres of proposed CH remain available for private development.

680 A GIS analysis was performed to identify all census tracts that intersect proposed CH/EH acres. For census tracts that were partially covered by CH/EH, projected growth was assumed to be evenly distributed throughout all land available for development in that census tract. The amount of growth projected within CH/EH was then estimated according to the percent of available land within the entire census tract that is also within CH/EH. Census tracts were grouped according to CH/EH unit, and projected growth was summed by development type (residential, office, etc.). As summarized in **Table 3**, approximately 9,300 acres and 4,800 acres of development growth are projected in proposed CH and proposed EH, respectively, through 2025.

## ARROYO TOAD LAND DEVELOPMENT ASSUMPTIONS

### **Off-setting Compensation Standards**

690 The economic impact of proposed CH/EH on private sector land development is directly linked to the type and level of off-setting compensation likely to be associated with future section 7 consultations or other habitat protection. This analysis relies on conservation measures described in historical AT BOs to estimate future off-setting compensation. Specifically, EPS identifies four AT BOs related to real estate development since the listing. As calculated in **Table 4**, the average off-setting compensation or set-aside ratio that results from these consultations is estimated to be approximately 1.25-to-1. A 1.25-to-1 ratio means that 1.25 acres of suitable AT habitat must be permanently preserved (through dedication of fee title or an appropriately

restrictive conservation easement) for every acre of development that occurs within suitable AT habitat. A more detailed description of the four BOs used to calculate this set-aside ratio is provided in **Appendix B**.

### **Net or Effective Land Development Set-Aside**

In reality, development rarely occurs on 100 percent of the project area assembled by a developer regardless of what degree of AT protection is in place. A development site will naturally include a relatively large portion of undeveloped acres set aside for a variety of factors, including slope, avoidance of hydrologic features (e.g., flood areas, wetlands, drainage channels), parcel configuration, and creation of “amenity features” such as landscaping, parks, and open space. Comparing land development projections to developable acres (see **Table 3**) reinforces the concept that a large proportion of land potentially available for development in reality will never actually be developed due to a variety of site constraints. Specifically, the projections suggest that approximately 9,300 acres of development through 2025 will occur within proposed CH, compared to about 49,000 potentially developable acres.

It is also important to note that the streambeds and other hydrologic channels that constitute the AT’s primary habitat tend to correlate closely with the areas a developer would be most likely to set aside, irrespective of AT protection. Developers tend to configure their projects to avoid such hydrologic features because development near streambeds and drainage channels is often more expensive than development further from such features. Factors contributing to this expense (independent of AT protection) include poorer soil stability near waterways, costs and risks associated with bank erosion, floodway restrictions, zoning provisions, and local streambed alteration ordinances.

This analysis assumes that future off-setting compensation for AT habitat will occur on both high-quality land that would have been developed in the absence of AT protection as well as lower quality land that would not have otherwise been developed by 2025. As discussed above, this analysis assumes that future AT protection associated with private development projects will be achieved via a 1.25-to-1 gross offsetting compensation ratio. When faced with such a compensation ratio, it is likely that developers will configure their projects such that areas that would have been set aside anyway, that is, not developed in the absence of AT protection, would also be likely to serve as compensation for development impacts.

To determine the proportion of “high-quality” versus “low-quality” land likely to be available for off-setting compensation, a GIS analysis is used to examine the percentage of CH/EH developable acres located within the 100-year flood plain.<sup>24</sup> The 100-year flood plain is used as a proxy for the “low quality” land that would not have been developed in the absence of AT habitat. In reality, some 100-year flood plain land will be developed while other areas outside the flood plain will not, due to other natural or

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<sup>24</sup> FEMA flood plain GIS data is relied upon for this calculation.

**Table 4**  
**Calculation of Average Set-Aside Ratio**  
**Economic Analysis of Critical Habitat Designation for the Arroyo Toad**

BO / Project (1)	Impacted Acres (2)	Set-Aside Compensation Acres (3)	Offsetting Compensation Ratio
Rancho Viejo Residential Development	52	127	2.44 : 1
Rancho Las Flores Planned Community	1,015	290	0.29 : 1
Pala Gaming Facility	20	20	1.00 : 1
Rincon Gaming Facility	53	68	1.28 : 1
<b>Average</b>			<b>1.25 : 1</b>

(1) See Appendix B for additional detail regarding past AT consultations on development projects.

(2) Refers to habitat area impacted by the project.

(3) Permanently preserved land set-aside.

geological factors. Nonetheless, GIS-based 100-year flood plain data represents the best available data upon which to estimate the proportion of “high-quality” to “low-quality” land within CH/EH.

This analysis assumes that land developers have access to acreage inside and outside of 100-year flood plain in the same proportions that these types of land occur in CH and EH. Thus, for a typical real estate project, a developer will set aside both “low-quality” flood plain land as well as “high-quality” non-flood plain land. The “high-quality” non-flood plain land that is set aside due to AT protection is assumed to reduce the size of a project and thus represent a net economic loss. However, because flood plains are typically left as open space unless costly flood control modifications are made, the land set-aside in these areas will not reduce a projects’ scale or pose any additional economic cost for a developer or landowner (potential set-aside maintenance costs are estimated separately below).

GIS analysis has determined that 20 percent of developable acres in CH/EH are located in the 100-year flood plain.<sup>25</sup> In other words, 20 percent of land set-aside under the 1.25-to-1 compensation ratio estimated in **Table 4** would have therefore been set aside regardless of AT protection. The amount of this overlap is not attributed to the proposed designation or to AT protection. Thus, a developers’ net or effective on-site set-aside occurs at a ratio of 1-to-1 while their off-site set-aside occurs at a ratio of 0.25-to-1. The 1-to-1 on-site compensation ratio implies that approximately 50 percent of projected development in proposed CH/EH would not occur as a result of AT protection (e.g., a 1,000 acre development project is reduced to 500 acres and 500 acres are set aside on site).

## **ECONOMIC IMPACT OF PROPOSED CHD**

This section uses the land development projections and assumptions described above to estimate (1) the number of projected development acres to be set aside due to AT protection, (2) the regional effect of that loss on real estate markets and prices, and (3) the present value loss of future development forgone due to AT protection. This section also evaluates the economic cost of historical land development associated with AT protection. The economic cost associated with foregone development (i.e., loss in land value) and additional AT protections (i.e., “other” project modifications) is summarized in **Table 1**, with more detailed descriptions and summaries provided below.

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<sup>25</sup> Note that this calculation is based on the April 2004 proposed CHD.

## PROJECTED DEVELOPMENT AFFECTED BY ARROYO TOAD PROTECTION

As discussed above, this analysis assumes that future projects in AT CH/EH must comply with a 1.25-to-1 compensation ratio, but that 20 percent of the gross offsetting compensation acreage will occur in the flood plain. The effect of AT protection on land supply is therefore calculated based on the loss of land forecasted to be set aside on site.

The results of these calculations for CH/EH in each proposed unit are shown in **Table 5**. Approximately 9,300 acres of total land development have been projected through 2025 in CH and approximately 4,800 acres in EH. This analysis estimates that approximately 50 percent of these projected growth acres – approximately 4,700 and 2,400 acres, respectively—will be set aside due to AT protection.

## REGIONAL REAL ESTATE EFFECTS

The cost incidence or economic burden of land development project modifications stemming from AT protection will be determined by their impact on the regional real estate market (i.e., on overall real estate production and prices). To determine the significance of AT-related project modifications for regional real estate markets, this analysis compares the reduction to market-wide demand and supply conditions.

Ideally, on-site land set-aside requirements should be compared with the total supply of developable land in the region. However, accurate estimates of total regional development potential are not readily available. Consequently, for the purposes of this analysis, projected acres of growth through 2025 in the six counties covered by SANDAG/SCAG data are used as proxy for regional market supply. Total land development potential in Santa Barbara County was estimated based on information contained in the *SBCAG Regional Growth Forecast, 2000-2030*. Regional development potential in Monterey County was estimated based on population forecasts developed by the AMBAG. A summary of projected land development for each County through 2025 is shown in **Table 6**.

A comparison of the total acres of on-site habitat set-aside in CH/EH as a result of AT protection with the total projected acres of growth through 2025 for each county is provided in **Table 7**. As shown, the estimated on-site habitat set-aside in CH represents approximately 0.7 percent of future growth, and the estimated on-site set-aside in EH represents roughly 0.4 percent of future countywide growth through 2025. San Diego is the only County where the estimated on-site set-aside represents greater than one percent of total projected development.

**Table 5**  
**Summary of Land Development Acres Set-Aside**  
**Economic Analysis of Critical Habitat Designation for the Arroyo Toad**

CH/EH Unit	Projected Development (Acres) [1]		Projected Gross Set-Aside (Acres) [2]		Projected On-Site Set-Aside (Acres) [3]	
	Critical Habitat	Excluded Habitat	Critical Habitat	Excluded Habitat	Critical Habitat	Excluded Habitat
1	--	0	--	0	--	0
2	2	--	1	--	1	--
3	0	--	0	--	0	--
4	0	--	0	--	0	--
5	4	--	2	--	2	--
6	139	577	87	361	70	289
7	224	--	140	--	112	--
8	19	107	12	67	10	53
9	0	444	0	278	0	222
10	565	0	353	0	283	0
11	161	0	101	0	81	0
12	392	0	246	0	196	0
13	331	897	207	561	166	449
14	1,315	0	823	0	658	0
15	787	--	492	--	394	--
16	1,659	654	1,038	409	830	327
17	401	993	251	621	201	497
18	932	286	583	179	467	143
19	1,993	540	1,247	338	998	270
20	38	--	24	--	19	--
21	0	--	0	--	0	--
22	334	317	209	198	167	159
23	32	--	20	--	16	--
<b>Total</b>	<b>9,330</b>	<b>4,815</b>	<b>5,838</b>	<b>3,013</b>	<b>4,670</b>	<b>2,410</b>

(1) Based on information from regional forecasting entities (e.g. SCAG, SANDAG, MCAG, and SBCAG) and the US Census.

(2) Gross set-aside is calculated based on the offsetting compensation ratio presented in Table 4.

(3) On-site set-aside is calculated based on gross set-aside and the percentage of high-quality land available in CH/EH.



**Table 6**  
**Projected Growth in Counties with Proposed Critical Habitat**  
**Economic Analysis of Critical Habitat Designation for the Arroyo Toad**

County	Source	Projected Growth Acres in County by 2025				Total
		Residential	Office	Retail	Industrial	
San Diego	SANDAG (1)	238,352	686	3,647	4,737	247,423
Orange	SCAG (2)	10,010	23,042	7,404	16,546	57,002
Los Angeles	SCAG (2)	60,372	23,243	6,268	-27,805	62,078
Ventura	SCAG (2)	3,979	6,052	2,029	3,618	15,677
Riverside	SCAG (2)	38,838	73,114	28,135	44,115	184,202
San Bernardino	SCAG (2)	29,694	26,526	9,745	18,259	84,224
Santa Barbara	SBCAG (3)	3,883	113	78	384	4,458
Monterey	AMBAG (4)	<u>8,440</u>	<u>N/A</u>	<u>N/A</u>	<u>N/A</u>	<u>8,440</u>
<b>Total</b>		<b>393,569</b>	<b>152,775</b>	<b>57,307</b>	<b>59,853</b>	<b>663,505</b>

(1) Land development projections provided by SANDAG.

(2) Land development estimated based on SCAG demographic and employment projections. See text for description of methodology.

(3) Based on countywide projections of new residential units and commercial land from 2005-2025 in SBCAG Regional Growth Forecast 2000-2030, report.

(4) Based on AMBAG population projections from 2005-2025. No commercial land or employment projections were available.

**Table 7**  
**Regional Significance of Projected Land Set-Aside**  
**Economic Analysis of Critical Habitat Designation for the Arroyo Toad**

County	Total County Growth through 2025 (Acres) [1]	Regional Significance of CH		Regional Significance of EH		Combined Regional Significance	
		On-site Acres Set-Aside	% of Projected County Growth	On-site Acres Set-Aside	% of Projected County Growth	On-site Acres Set-Aside	% if Projected County Growth
San Diego	247,423	3,907	1.6%	1,238	0.5%	5,145	2.1%
Orange	57,002	373	0.7%	53	0.1%	427	0.7%
Los Angeles	62,078	184	0.3%	289	0.5%	473	0.8%
Ventura	15,677	0	0.0%	0	0.0%	0	0.0%
Riverside	184,202	19	0.0%	671	0.4%	690	0.4%
San Bernardino	84,224	186	0.2%	159	0.2%	345	0.4%
Santa Barbara	4,458	1	0.0%	0	0.0%	1	0.0%
Monterey	8,440	0	0.0%	0	0.0%	0	0.0%
<b>Total</b>	<b>663,505</b>	<b>4,670</b>	<b>0.7%</b>	<b>2,410</b>	<b>0.4%</b>	<b>7,080</b>	<b>1.1%</b>

(1) From Table 6.

It is important to note that the estimates summarized in **Table 7** represent an over-estimate of the AT protection efforts on regional development opportunities. The following factors suggest that the AT-related on-site habitat set-aside will actually represent a much smaller proportion of the regional real estate market.

- 820       **1. Regional land supply is greater than projected demand through 2025.** The above estimate relies on projected land consumption through 2025 as a proxy for long-term supply. In reality, the long-term land supply is greater than demand through 2025 because many of the communities within the eight-county area are not expected to reach build-out until significantly beyond that date.
- 830       **2. Developers will adjust to reduced land supply by increasing density.** The above estimate assumes that development in areas both inside and outside of CH/EH cannot occur at higher densities. In practice, increased densification as well as revitalization of under-utilized “in-fill” sites can continue to provide significant development opportunities in land constrained markets.

Given the factors described above, and the fact that 0.7 percent is itself a small component of real estate supply, the set-aside associated with AT protection is not expected to have a significant impact on the dynamics of the regional real estate market. Hence, housing prices in each county are not expected to be affected, and regulated landowners will bear the cost associated with AT protection. Some projects may be distributed to other locations, while others may proceed with higher mitigation costs and lower land values, but no effect on market real estate prices is anticipated.

## ECONOMIC IMPACT OF LOST LAND DEVELOPMENT OPPORTUNITIES

- 840       This section calculates the loss in land value for on-site set-aside due to AT conservation activities in historical and projected private development projects.

### **Real Estate Land Value Data and Assumptions**

Residential, commercial, and industrial market data for each of the eight counties were used to estimate the cost, or lost value, of on-site set-aside acres. Summaries of raw market data and the calculation of the “residual land value” by real estate product type are presented in **Table 8**.

- 850       The residual land value is an estimate of the value of a raw, unimproved parcel with no infrastructure that is zoned for the development type in question (e.g., single-family residential, office, etc.). The use of unimproved land values is appropriate because a developer seeking project entitlement will not invest money in infrastructure or other improvements on land designated as a habitat set-aside through the consultation process—using improved land prices would therefore overestimate the land value lost due to AT protection. Appropriately zoned land was assumed because this analysis is based on demographic projections provided by official regional agencies; the fact that

**Table 8**  
**Residential and Commercial Residual Land Value Calculations**  
**Economic Analysis of Critical Habitat Designation for the Arroyo Toad**

Land Use / Item	Land Value Calculations by County							
	San Diego	Orange	Los Angeles	Ventura	Riverside	San Bernardino	Santa Barbara (10)	Monterey (10)
<b>Residential</b>								
Median home price (1)	\$513,733	\$341,799	\$462,127	\$552,292	\$265,926	\$269,630	\$337,237	\$553,122
Gross property value (2)	\$2,568,663	\$1,708,996	\$2,310,636	\$2,761,459	\$1,329,631	\$1,348,150	\$1,686,187	\$2,765,609
Residual Value / Acre @ 11% (3)	<b>\$275,884</b>	<b>\$183,552</b>	<b>\$248,171</b>	<b>\$296,591</b>	<b>\$142,807</b>	<b>\$144,796</b>	<b>\$181,103</b>	<b>\$297,036</b>
<b>Office</b>								
Annual Lease Rate (NNN) [4]	\$21.60	\$23.52	\$25.20	\$19.08	\$19.68	\$19.68	N/A	N/A
Gross Revenue / Gross Ac. (5)	\$265,921	\$289,558	\$310,241	\$234,897	\$242,283	\$242,283	N/A	N/A
Net Operating Income (6)	\$257,943	\$280,871	\$300,934	\$227,850	\$235,015	\$235,015	N/A	N/A
Capitalized Value / Ac. (7)	\$2,866,035	\$3,120,793	\$3,343,707	\$2,531,664	\$2,611,276	\$2,611,276	N/A	N/A
Residual Value / Acre @ 10% (3)	<b>\$286,603</b>	<b>\$312,079</b>	<b>\$334,371</b>	<b>\$253,166</b>	<b>\$261,128</b>	<b>\$261,128</b>	N/A	N/A
<b>Retail</b>								
Annual Lease Rate (NNN) [8]	\$23.28	\$26.16	\$24.24	\$18.35	\$16.92	\$16.92	N/A	N/A
Gross Revenue / Gross Ac. (5)	\$268,781	\$302,032	\$279,865	\$211,898	\$195,351	\$195,351	N/A	N/A
Net Operating Income (6)	\$260,718	\$292,971	\$271,469	\$205,541	\$189,491	\$189,491	N/A	N/A
Capitalized Value / Ac. (7)	\$2,896,862	\$3,255,237	\$3,016,321	\$2,283,786	\$2,105,452	\$2,105,452	N/A	N/A
Residual Value / Acre @ 15% (3)	<b>\$434,529</b>	<b>\$488,286</b>	<b>\$452,448</b>	<b>\$342,568</b>	<b>\$315,818</b>	<b>\$315,818</b>	N/A	N/A
<b>Industrial (3)</b>								
Annual Lease Rate (gross) [9]	\$11.04	\$6.96	\$6.12	\$7.68	\$4.44	\$4.44	N/A	N/A
Gross Revenue / Gross Ac. (5)	\$97,082	\$61,204	\$53,817	\$67,535	\$39,044	\$39,044	N/A	N/A
Net Operating Income (6)	\$77,666	\$48,963	\$43,054	\$54,028	\$31,235	\$31,235	N/A	N/A
Capitalized Value / Ac. (7)	\$862,953	\$544,035	\$478,376	\$600,315	\$347,057	\$347,057	N/A	N/A
Residual Value / Acre @ 10% (3)	<b>\$86,295</b>	<b>\$54,404</b>	<b>\$47,838</b>	<b>\$60,031</b>	<b>\$34,706</b>	<b>\$34,706</b>	N/A	N/A

(1) Based on the median home price per square foot in eight counties from 1998 to 2002, inflated to 2004 dollars, based on data from RAND.

(2) Assumes 5 units per gross acre.

(3) Residual land value is the value of raw, unimproved land that is zoned for development. It is calculated as a percentage of finished product value, as shown (see Table 9 for calculation for residential residual land value).

(4) Office lease rate data from CB Richard Ellis Q4, 2003.

(5) Lease rate (/SqFt) converted to a per-acre basis and multiplied by (a) FAR, (b) occupancy rate, and (c) a 'net-to-gross' factor to account for parking, landscaping, and other vacant site uses.

(6) Operating expenses assumed to be 3.0% of gross revenue for office and retail, and 20% of gross revenue for industrial.

(7) Assumes 9% capitalization rate.

(8) Retail lease rate data from Marcus & Millichap Retail Research Report, February 2004 and CB Richard Ellis Q4, 2003; Ventura County lease rate

(9) Industrial lease rate data from CB Richard Ellis 4Q, 2003 and 1Q, 2004.

(10) Only residential growth is expected in CH/EH in these counties, so no commercial data was collected.

Sources: Data Quick; CB Richard Ellis; Marcus & Millichap; Economic & Planning Systems, Inc.

growth is projected to occur assumes that the underlying land is (or will be) zoned appropriately by the time that growth is expected to occur. This assumption is more likely to overestimate than underestimate the actual cost of the designation than a calculation assuming no entitlements (i.e., zoning) are in place.

This analysis assumes that the value of raw, unimproved land will range from 10 to 15 percent of finished product value, depending on the type of land use in question. In reality, raw land values can vary substantially depending on unique physical and locational factors as well as the market conditions that exist at the time of sale. However, given that reliable raw land sales data is unavailable, this analysis relies on a residual land value estimate calculated using observed market values for finished products (e.g., new home sales or industrial and commercial lease rates).

A residual land value calculation for a typical single-family residential product is provided in **Table 9**. The assumed home price of \$412,000 represents an average for single-family units in the eight counties included in this analysis. As shown, the residual land value for a typical residential product represents approximately 11 percent of the finished product price. The residual land value for office, retail, and industrial land generally exhibits a similar relationship to finished product value, with retail slightly higher given the importance of site location and industrial slightly lower.

Finally, this analysis assumes that raw land values will experience real appreciation through time, reflecting the relatively strong performance of California's real estate markets over the last ten to 20 years. Specifically, raw land values are assumed to appreciate at a rate of 3.4 percent per year in real terms (i.e., adjusted for inflation) over the next 21 years, or through 2025. This rate reflects an average of a 10-year and a 20-year trend in repeat sales or refinancing of the same residential properties in California, a method that controls for changes in housing quality, location, and size.<sup>26</sup> Based on this indexing method, the real value of housing grew at 3.1 percent per year between 1983 and 2003 and at 3.7 percent between 1993 and 2003. The average of these rates, or 3.4 percent, is judged appropriate for this analysis given the 21-year time frame and the fact the bulk of the potential development within AT essential habitat is residential.

### **Potential Future Land Value Losses**

Future land value losses for private development projects through 2025 are estimated by calculating the lost residual land value of on-site acres expected to be set aside due to AT protection. Projected development (and on-site set-aside) is assumed to be evenly distributed through 2025; the economic impact associated with on-site set-aside is therefore calculated as the present value of future annual land value losses, assuming a

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<sup>26</sup> Based on data from Office of Federal Housing Enterprise Oversight (OFHEO), 3Q 2004 data for the individual State index, downloaded January 27, 2005, available at <http://www.ofheo.gov/HPI.asp>, and U.S. Department of Labor, Bureau of Labor Statistics, CPI less shelter for Western urban areas, downloaded January 27, 2005 at <http://www.bls.gov>.

**Table 9**  
**Residual Land Value Calculation for a Single-Family Residential Product**  
**Economic Analysis of Critical Habitat Designation for the Arroyo Toad**

Cash-Flow Item		Amount
<b>Project Summary</b>		
Avg. Price Per Unit (1)		\$412,000
Avg. sq.ft. / Unit		2,092
Avg. FAR		0.4
Avg. # of Units / Gross Acre		5.0
Net to Gross Ratio (2)		20%
Units per Net Acre		6.3
Avg. Lot Size		5,230
<b>Revenues</b>		
Avg. Price Per Unit (1)		\$412,000
Avg. Price per SF		\$197
Total Revenues / Gross Acre		\$2,060,000
<b>Direct Costs (excluding land)</b>		
Building costs / Sqft.		\$103
Total		\$1,077,458
In Tract Costs / lot		\$16,500
Total		<u>\$82,500</u>
<b>Subtotal</b>		\$1,159,958
<b>Indirect Costs (excluding land)</b>		
Planning & Entitlement	0.35% of direct costs	\$4,060
Fees & Permits	3.0% of direct costs	\$34,799
Architecture & Engineering	1.65% of direct costs	\$19,139
Construction Management	2.0% of direct costs	\$23,199
General & Administrative	3.0% of direct costs	\$34,799
Financing & Charges	5.0% of direct costs	\$57,998
Sales & Marketing	5.0% of unit value	\$57,998
Contingency	3.0% of direct costs	<u>\$34,799</u>
<b>Subtotal</b>		\$266,790
<b>Total Development Costs</b>		\$1,426,749
Per Unit		\$285,350
Per Sqft.		\$136
<b>Developer Profit @</b>		<b>25% (3)</b>
Per Unit		\$412,000
		\$82,400
<b>Residual Land Value</b>		
Project Wide		\$221,251
Per Unit		\$44,250
Land Value/Unit Sales Price		10.74%

(1) Represents the average of median home prices in eight counties from 1998 to 2002, inflated to 2004 dollars, based on data from RAND.

(2) Based on data from RS Means.

(3) Based on standard real estate industry pre-tax return on investment criteria.

Source: Economic & Planning Systems, Inc.

7 percent discount rate. The results of these calculations are summarized by county in **Table 10** with detailed calculations shown in **Appendix Tables B-1** and **B-2**.

The present value of future land value losses are estimated to be approximately \$880 million in proposed CH and \$411 million in proposed EH.

As described above, the total amount of land projected to be set aside due to AT protection does not represent a significant proportion of the total land supply. No regional price increases are therefore expected, and the cost burden of the proposed rulemaking is expected to fall entirely on the landowner in the form of reduced raw land prices for parcels affected by proposed CH/EH.

### **Potential Historical Land Value Losses**

This analysis estimates land value losses incurred due to historical compliance with AT protection based on actual project modifications required through past section 7 consultation with the Service. Since the time of the AT listing in 1994, only four formal consultations for private land development projects were completed that involved the AT, as summarized in **Table 11**. As shown, these four projects were required to permanently set aside acreage as compensation for project-related impacts to AT habitat.

No historical development projects requiring AT protection measures have been identified in EH units. It is possible that development projects covered by an HCP occurred without project-specific consultation with the Service. EPS believes that there are relatively few projects of this nature. Because AT habitat is adjacent to stream reaches, it is likely that any such development projects would have required Clean Water Act permitting and, therefore, consultation with the Service. The consultation history does not reflect any such consultation. Nevertheless, the AT is a listed species in the regional HCPs in a number of southern California counties. Consequently, the costs of creating these HCPs are in part attributable to the AT. These costs are estimated separately in **Chapter VI**.

The loss in development value in the year the impact occurred is estimated by multiplying the number of acres set aside by the estimated residential residual land value (in constant 2004 dollars) for the appropriate county. The present value of the historical loss is then estimated assuming an opportunity cost of money of 7 percent. As shown in **Table 11**, the historical projects also incurred “other” project modification costs that are discussed below.

### **“OTHER” PROJECT MODIFICATION COSTS**

This section evaluates the economic impact of implementing conservation measures other than land set-aside, such as biological surveys, monitoring, exclusionary fencing and land management—referred to hereafter as “other” project modifications.

**Table 10**  
**Value of Land Development Set-Aside in Essential Habitat**  
**Economic Analysis of Critical Habitat Designation for the Arroyo Toad**

CH Unit	Present Value Loss of Acres Set-Aside in CH					Present Value Loss of Acres Set-Aside In EH				
	Residential	Office	Retail	Industrial	Total	Residential	Office	Retail	Industrial	Total
<b>Monterey</b>	--	--	--	--	--	\$111	--	--	--	\$111
<b>Santa Barbara</b>	\$147,848	--	--	--	\$147,848	\$0	--	--	--	\$0
<b>Ventura</b>	\$11,548	\$0	\$0	\$0	\$11,548	\$0	\$0	\$0	\$0	\$0
<b>Los Angeles</b>	\$6,095,469	\$18,807,549	\$6,814,856	\$1,587,533	\$33,305,407	\$30,972,433	\$13,992,661	\$5,070,497	\$1,181,235	\$51,216,825
<b>Orange</b>	\$5,857,159	\$36,101,577	\$17,872,058	\$4,215,855	\$64,046,648	\$791,130	\$5,211,103	\$2,577,928	\$606,559	\$9,186,720
<b>San Diego</b>	\$751,963,390	\$13,375	\$3,986,883	\$348,669	\$756,312,318	\$236,657,498	\$0	\$1,785,281	\$547,184	\$238,989,964
<b>San Bernardino</b>	\$4,403,718	\$12,775,952	\$5,800,076	\$1,133,337	\$24,113,083	\$3,217,567	\$11,373,780	\$5,163,539	\$1,008,951	\$20,763,837
<b>Riverside</b>	\$450,932	\$1,339,095	\$624,614	\$107,203	\$2,521,843	\$10,924,032	\$51,742,344	\$24,135,015	\$4,142,299	\$90,943,691
<b>Total</b>	<b>\$768,930,064</b>	<b>\$69,037,548</b>	<b>\$35,098,487</b>	<b>\$7,392,597</b>	<b>\$880,458,696</b>	<b>\$282,562,772</b>	<b>\$82,319,888</b>	<b>\$38,732,260</b>	<b>\$7,486,228</b>	<b>\$411,101,147</b>



**Table 11**  
**Historical Set-Aside Costs**  
**Economic Analysis of Critical Habitat Designation for the Arroyo Toad**

Historical Projects with AT Protection			Required Land-Based Conservation Measures (1)	Project Modification Costs			
Project	County	Date		Residual Land Value / Acre (2)	Total Land Value Loss (3)	Other Project Modification Costs (4)	Present Value of Historical Costs (5)
1. Rancho Las Flores (Unit 22)	San Bernardino	2003	290 ac. conservation easement on-site	\$129,625	\$7,518,250	\$311,318	<b>\$8,113,118</b>
2. Rancho Viejo (Unit 14)	San Diego	2000	127 ac. Set-aside		<i>Project has not gone forward</i>		
3. Pala Gaming Facility (Unit 14)	San Diego	2000	20 ac. Set-aside	\$213,000	\$3,408,000	\$311,318	<b>\$4,316,057</b>
3. Rincon Gaming Facility (Unit 14)	San Diego	2000	68 ac. Set-aside	\$213,000	\$2,896,800	\$311,318	<b>\$3,729,860</b>
<b>Total</b>					<b>\$13,823,050</b>	<b>\$933,955</b>	<b>\$16,159,034</b>

(1) As described in the Biological Opinion for each project.

(2) Based on the median single family home sales price (nominal dollars) in the year the Biological Opinion was issued, inflated to \$2004 dollars based on the CPI increase.

(3) Residual land value per acre multiplied by the number of acres non-flood-plain acres set aside for AT protection (\$2004). Based on personal communication with the Service, 80 percent of the Rancho Las Flores and Rincon set-aside is located in flood plain/reservoir high water area. Based on GIS analysis of CH/EH, it is assumed that 20 percent of the Pala set-aside is in the flood plain.

(4) Estimated cost per-project of non-land-related project modification costs. See Table 12.

(5) Assumes a discount rate of 7.0% and real appreciation in land value.

### **Historical Project Modification Costs**

940 The BOs for each of the four historical projects that consulted on the AT described a range of conservation measures associated with AT protection, including land set-aside, surveying, biological monitoring, exclusionary fencing, land management, and minimization of construction activities near known AT habitat and/or during breeding season. As shown in **Table 12**, this analysis estimates the cost of implementing these “other” project modifications by calculating the cost to perform three nocturnal AT surveys, hire a biological consultant one-quarter time for a one-year project duration, install exclusionary fencing around 50 percent of the development area, and manage land set-aside for species conservation. The cost per-project to implement “other” project modifications is approximately \$311,000.

### **Future Project Modification Costs**

950 This analysis assumes that future projects will be required to implement the same suite of “other” project modifications (e.g., biological monitoring, fencing, etc.) as the four historical section 7 consultations described above. The total cost of “other” project modifications is estimated to be approximately \$311,000 per project. To estimate the number of future projects likely to be associated with projected growth in CH/EH, this analysis relies on an estimate of the number of projects that will be subject to CEQA requirements.<sup>27</sup> The estimation of the number of projects is described in further detail in **Chapter VI**.

960 As shown in **Table 13**, this analysis estimates that approximately 349 projects are expected to occur through 2025 in proposed CH, and 234 future projects in proposed EH.<sup>28</sup> The estimated cost of implementing “other” project modifications for these projects is approximately \$56 million and \$38 million for CH and EH, respectively, in present value terms.

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<sup>27</sup> The analysis assumes that all projects subject to the CEQA process will require section 7 or section 10 permitting.

<sup>28</sup> The estimated future consultation rate significantly exceeds the historical rate: this analysis estimates 349 section 7 consultations (or section 10 permitting) in CH through 2025, compared with only four historical consultations since 1994. The relative infrequency of historical consultations may be due to the fact that little was known about the spatial extent of AT occupancy, and relatively few projects were therefore required to consult for AT protection. Because the Proposed Rule states that all proposed CH is assumed to be occupied by the species, this analysis considers this to represent new information regarding the spatial extent of AT distribution. It is therefore assumed that all future development in proposed CH/EH will be required to initiate section 7 consultations (or section 10 permitting) for the AT. This assumption is more likely to overestimate than underestimate the actual cost of the proposed rulemaking.

**Table 12**  
**Project Modification Costs Other than Land Set-Aside**  
**Economic Analysis of Critical Habitat Designation for the Arroyo Toad**

<b>Project Modification Category</b>	<b>Specific Conservation Measures per Project (1)</b>	<b>Unit Cost</b>	<b>Other Project Modification Costs per Project</b>
Biological Surveys	3 nocturnal surveys	\$2,800 / survey	\$8,400
Biological Monitoring	One year of monitoring at 1/4-time	0.25 FTE; \$70,000 salary	\$17,500
Exclusionary Fencing	Fencing around 50% of development area	\$5 / linear ft.	\$14,530
Management of Preservation Land	Management plan and implementation (2)	\$25,000 / year	\$270,888
<b>Total Cost per Project</b>			<b>\$311,318</b>

(1) Based on Conservation Measures described in the 4 historical Biological Opinions summarized in Table 11. Assumes average project size of 24 acres.

(2) Land management costs are calculated to occur through 2025 and are discounted at 7%.

**Table 13**  
**Future Project Modification Costs Other than Land Set-Aside**  
**Economic Analysis of Critical Habitat Designation for the Arroyo Toad**

CH / EH Unit	Projected Growth (1)		Estimated Projects (2)		Present Value of Proj Mod Costs (3)	
	Critical Habitat	Essential Habitat	Critical Habitat	Essential Habitat	Critical Habitat	Essential Habitat
1	--	0	--	0	--	\$66
2	2	--	2,174	--	\$349,199	\$0
3	0	--	0	--	\$2,928	\$0
4	0	--	0	--	\$1,303	\$0
5	4	--	1	--	\$110,044	\$0
6	139	577	24	100	\$3,879,780	\$16,055,702
7	224	--	39	--	\$6,241,580	\$0
8	19	107	1	6	\$178,270	\$980,333
9	0	444	0	13	\$58	\$2,053,428
10	565	0	32	0	\$5,198,350	\$0
11	161	0	9	0	\$1,486,025	\$1,445
12	392	0	11	0	\$1,728,770	\$1,240
13	331	897	9	26	\$1,459,013	\$4,146,875
14	1,315	0	36	0	\$5,792,237	\$1,726
15	787	--	22	--	\$3,466,140	\$0
16	1,659	654	45	18	\$7,308,599	\$2,882,150
17	401	993	11	27	\$1,765,060	\$4,374,910
18	932	286	26	8	\$4,106,759	\$1,260,937
19	1,993	540	55	15	\$8,781,053	\$2,378,347
20	38	--	3	--	\$417,266	\$0
21	0	--	0	--	\$0	\$0
22	334	317	23	22	\$3,692,613	\$3,505,786
23	32	--	1	--	\$149,828	\$0
<b>Total</b>	<b>9,330</b>	<b>4,815</b>	<b>349</b>	<b>234</b>	<b>\$56,114,873</b>	<b>\$37,642,945</b>

(1) See Table B-1 and Table B-2.

(2) Number of projects corresponds with estimated number of projects subject to CEQA documentation. Average project size is calculated to be 24 acres.

(3) Assumes non-land-related project modifications cost \$311,318 per project (see Table 12) and are evenly distributed through 2025. Present value calculation assumes a 7.0% discount rate.

## ADMINISTRATIVE CONSULTATION COSTS

In addition to project modification costs, past and future section 7 consultations will result in administrative costs based on the time spent preparing for, participating in, and completing the consultation process. This analysis assumes that each consultation will include the Service, the Action Agency, and one “third party” (i.e., the applicant). The total administrative cost of section 7 consultations is presented in **Appendix F**.

## SUMMARY OF ESTIMATED ECONOMIC IMPACTS

A summary of the total economic impact of AT protection on private land development (excluding administrative costs) is shown in **Table 1**. The total cost of future project modifications (including on-site set-aside and “other” project modification) is estimated to be approximately \$937 million in proposed CH and \$449 million in proposed EH.

## CAVEATS TO ECONOMIC COST EVALUATION

The economic cost impacts estimated in this chapter are based on a series of assumptions that are more likely to overestimate than underestimate the actual cost of the proposed rulemaking. Certain factors should be taken under consideration when evaluating the costs described above:

- 1. Pre-existing regulations not taken into account.** The costs described above were calculated assuming all project modifications involving AT habitat are attributable to the proposed rulemaking. In reality, land developers would likely have to implement many of the same project modifications (and incur the same costs) absent the proposed rulemaking. In particular, it is likely that the USACE would require mitigation for alteration to “waters of the U.S.” (e.g., streambeds, drainage features, etc.) irrespective of AT protection. A number of other pre-existing regulations, including approved regional and project-specific HCPs, also provide protection for the AT independent of the proposed rulemaking. This analysis ignores all such baseline regulations.
- 2. Unoccupied Areas without a Federal nexus may not be affected.** According to the Service, although the proposed CHD and EH are regarded as occupied by the AT, numerous acres within these units may be unoccupied. In these unoccupied areas, developers are likely to be able to pursue their projects without conducting significant AT-related conservation measures. This is especially true in areas in which a Federal nexus does not exist. Specifically, in unoccupied areas without a Federal nexus, there may not be a regulatory trigger leading to the implementation of AT conservation activities. The economic impact estimates presented herein ignore the possibility that some development projects may occur within proposed CHD or EH that entirely avoid the need to conduct AT conservation activities.

- 1010      **3. Lost development opportunities not offset by gains in other areas.** This analysis calculates the value of land development losses due to AT protection as a “net loss” to society. In reality, given the strength of the real estate market and the amount of developable land outside the proposed designation, it is likely that development opportunities forgone due to AT protection may in fact be offset by increased density. While individual landowners within the proposed designation would still experience real economic losses, the “net” economic impact to society would be reduced as landowners outside the proposed designation experience off-setting economic gains.
- 1020      **4. Economic losses not off-set by economic gains.** This analysis endeavors to capture the net economic impact imposed on regulated entities and the regional economy resulting from AT conservation efforts. To the extent possible, the estimated net economic impact should account for any offsetting benefits that might accrue to the regulated community due to their AT habitat preservation activities. For example, in certain cases real estate development that effectively incorporates AT habitat set-aside on site might realize a value premium typically associated with additional open space. Any such premium will offset land preservation costs borne by landowners/developers. Reliable data revealing the premium that the market places on nearby open space in Southern California is not readily available. However, it is likely that any such value is limited given the nature of lands being set aside for habitat.

### III. ECONOMIC IMPACT TO WATER SUPPLY

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1030 This chapter evaluates the impact of proposed AT CHD and species protection on the supply of water from reservoirs and dams. Specifically, it considers the economic impact borne by water consumers, such as households and farmers. The analysis estimates both the costs associated with potential investments in water supply infrastructure as well as with increased water prices, a corresponding loss in consumer surplus, and reduced employment. All water supply costs are prospective, as no significant modifications to water operations have occurred to date.

#### BACKGROUND

1040 The historical record of AT consultations contains only one consultation regarding on-going water operations at dams, diversions, or hydropower facilities.<sup>29</sup> The Service has consulted formally on one-time water infrastructure projects more frequently.<sup>30</sup> Nonetheless, Service biologists and water managers believe that future AT conservation activities will likely impact water management and may generate significant costs.<sup>31</sup>

1050 Project modifications developed in the context of section 7 or section 9 of the Act may result in the management of in-stream water flow rates in some stream reaches so that they more closely mimic the stream's natural flow. The *Proposed Designation of Critical Habitat for the Arroyo Toad* states that "...unnatural water releases from dams can wash away AT eggs and tadpoles, promote the growth of exotic species, or reduce the availability of open sand bar habitat."<sup>32</sup> Thus, the Service may request a reduction in the maximum allowable in-stream flow rate during the AT breeding season (i.e., late spring and early summer months in most areas), reducing water supply to downstream users. Conversely, "breeding pools must exist long enough for the completion of larval development (at least in most years), which is generally March through June, depending on location and weather."<sup>33</sup> Thus, in areas where water management results in extended drought conditions downstream, the Service may request reduced diversion of water upstream from AT CH during the AT breeding season, providing the necessary flow for successful AT breeding.

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<sup>29</sup> Biological Opinion for the Continued Operation of Existing Water Diversion Structures at Fox and Alder Creeks, Santa Barbara County, California. Project modification costs associated with this consultation are not estimated due to insufficient data. The administrative cost of this consultation is estimated and provided in **Appendix F**.

<sup>30</sup> Water infrastructure projects are addressed in the "Utilities and Other Infrastructure" section of this report.

<sup>31</sup> Personal Communication with Creed Clayton, Ventura FWO, February 6, 2004 and Eva Bagley, Licensing and Regulatory Chief, California Department of Water Resources, February 13, 2004.

<sup>32</sup> Endangered and Threatened Wildlife and Plants; Proposed Designation of Critical Habitat for the Arroyo Toad (*Bufo californicus*); Proposed Rule, Department of the Interior, Fish and Wildlife Service, April 28, 2004.

<sup>33</sup> Ibid.

1060 The proposed AT CHD cites hydrologic regime as a primary reason for special management considerations in six of the 23 units proposed for CHD. In particular, flow regime issues at Pyramid Dam and Big Tujunga Dam are referenced in the proposed designation. EPS has identified three additional CH units and one EH unit where AT concerns may induce changes in water management. An overview of the water management agencies that may be affected by changes to water management intended to protect the AT and its habitat is provided in **Table 14**.

## **WATER IMPACT METHODOLOGY**

1070 The proposed AT designation states that there are stream reaches where changes in water management would benefit the species. Specifically, the Service asserts that management of water releases to mimic “natural flows” will provide habitat conditions necessary for AT breeding. Discussions with the Service indicate that the development of a water flow management plan intended to protect the AT is a possibility for dams and diversions located within or upstream from CH.

1080 The specific changes to water management that will be requested to protect the AT and its habitat are unknown at this time. However, it is possible to develop an upper-bound cost estimate based on existing information. For each dam, this analysis estimates upper-bound economic impacts from AT CHD through analysis of the cost to replace water likely to be made unavailable to end-users due to AT protections (i.e., water “replacement cost”). Generally, this analysis estimates water replacement volumes by assuming that the Service will enter negotiations with water managers and seek water releases that mimic natural flows during the breeding season.<sup>34</sup> It is possible that the Service will not recommend any changes in water management.

EPS has discussed water operations with the major water agencies and districts that may be affected by AT CHD. The conversations reveal that some agencies/districts have access to substitute sources of water while others do not. For agencies/districts with an existing substitute source of water, EPS examines the replacement cost associated with use of this alternative, existing source. Where a substitute source of water does not exist, EPS examines the cost to replace the lost water through the development of a substitute source (e.g., new pipeline).

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<sup>34</sup> Please note that negotiations associated with a proposed action may arise from the presence of a Federal nexus (ESA section 7 consultation) or as a result of ESA section 9 (take) violation.



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<b>Table 14</b> <b>Water Agencies Potentially Affected by Management Changes for the Arroyo Toad</b> <b>Economic Analysis of Critical Habitat Designation for the Arroyo Toad</b>		
<b>Water Agency</b>	<b>Potential Project Modification</b>	<b>Unit</b>
United Water Conservation District	Releases from Pyramid Lake to Piru Creek	5
Montecito Water District	Releases from Jameson Lake to the Santa Ynez River	3
California Department of Water Resources	Releases from Castaic Lagoon to Castaic Creek	6
City of Los Angeles	Releases from Big Tujunga Dam to Big Tujunga Creek	7
City of Escondido and Vista Irrigation District	Diversion of the San Luis Rey River at the La Jolla Indian Reservation	14
Sweetwater Authority	Releases from Loveland Reservoir to the Sweetwater River	18
Coachella Water District and Desert Water Agency	Releases from the Colorado River Canal to the Whitewater River	23
City of San Diego	Releases from El Capitan Reservoir to the San Diego River	17
	Releases from San Vicente Reservoir to San Vicente Creek	17
	Releases from Morena Reservoir to Cottonwood Creek	19
	Releases from Sutherland Lake to Santa Ysabel Creek	16
Helix Water District	Releases from Cuyamaca Reservoir to the San Diego River	17

Additionally, EPS has determined that dam characteristics will influence the magnitude of the cost impacts attributable to AT protections. Dams designed for controlled release of water are better suited to meet Service flow recommendations. Those dams without controlled release capabilities may need either to be retrofitted with inlet/outlet works and pumping/control infrastructure or removed. A description of the potentially affected water management areas, including the presence of an existing substitute source of water and capability of controlled release, is presented in **Table 15**.

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<b>Table 15</b> <b>Categorization of Upper-Bound Water Management Impacts</b> <b>Economic Analysis of Critical Habitat Designation for the Arroyo Toad</b>		
	<b>Substitute Water Source</b>	<b>No Substitute Water Source</b>
<b>Controlled Release</b>	<ul style="list-style-type: none"> <li>• Big Tujunga Dam</li> <li>• City of Escondido Diversion</li> <li>• Cuyamaca Reservoir</li> <li>• Loveland Reservoir</li> <li>• Morena Reservoir</li> </ul>	<ul style="list-style-type: none"> <li>• Pyramid Lake</li> </ul>
<b>No Controlled Release</b>	<ul style="list-style-type: none"> <li>• Castaic Reservoir</li> <li>• El Capitan Reservoir</li> <li>• Jameson Lake</li> <li>• San Vicente Reservoir</li> <li>• Sutherland Lake</li> </ul>	<ul style="list-style-type: none"> <li>• Colorado River Aqueduct (Whitewater River)</li> </ul>

**Table 16** presents an overview of the methodology and analytical assumptions used to measure upper-bound impacts.

<b>Table 16</b> <b>Assumptions Used to Calculate Upper-Bound Water Management Impacts</b> <b>Economic Analysis of Critical Habitat Designation for the Arroyo Toad</b>		
	<b>Substitute Water Source</b>	<b>No Substitute Water Source</b>
<b>Controlled Release</b>	<ul style="list-style-type: none"> <li>• 50% of expected water releases are foregone during AT breeding season.</li> <li>• Foregone releases are replaced at current water prices.</li> </ul>	<ul style="list-style-type: none"> <li>• Future water releases are subject to current AT-related management agreement.</li> <li>• Water replacement requires development of a substitute water source.</li> </ul>
<b>No Controlled Release</b>	<ul style="list-style-type: none"> <li>• Release infrastructure is requested.</li> <li>• Natural flows are provided for the AT.</li> <li>• Natural flows are replaced at current water prices.</li> </ul>	<ul style="list-style-type: none"> <li>• Development of a substitute water source is requested to avoid AT impacts.</li> </ul>

## CONTROLLED RELEASE/SUBSTITUTE WATER SOURCE

1110 For water management areas where controlled releases occur and substitute water sources are available, EPS examined historical controlled release data to estimate the expected controlled release volume during the AT breeding season.<sup>35</sup> EPS assumes that large controlled water releases will be prohibited during the AT breeding season. According to a recent USGS report assessing the risk of dam operations to the AT, dam releases occurring during the AT breeding season are the biggest concern for reproductive success of the species.<sup>36</sup> EPS follows the USGS report methodology for determining the probability of controlled release during the AT breeding season. Additionally, EPS considers the volume of water likely to be released during the breeding season and the current replacement cost of water.

EPS estimates upper-bound impacts by assuming that water managers will need to replace water that they would have released during the AT breeding season. Examination of foregone water releases is appropriate for the measurement of upper-bound impacts given the following assumptions:

<sup>35</sup> Breeding season is March 15 through June 15 except in desert areas where it is March 15 through August. Personal Communication with Andreas Chavez, Fish and Wildlife Biologist, Carlsbad FWO, March 29, 2004.

<sup>36</sup> Madden-Smith et al., *Assessing the Risk of Loveland Dam Operations to the Arroyo Toad (Bufo Californicus) in the Sweetwater River Channel, San Diego County California*, U.S. Department of the Interior, U.S. Geological Survey, 2003.

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- First, it is likely that water managers will be required to supply in-stream flows for AT breeding. According to water managers, natural (low flow rate) in-stream flows are likely to be lost to infiltration (i.e., seepage into the ground). Generally, water managers release water at above-natural flow levels to minimize the quantity of water lost to infiltration.<sup>37</sup>

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- Second, water not released during the AT breeding season may remain in storage until the following year. It is undesirable to release water during summer months due to infiltration losses. Water remaining in storage limits storage capacity and water capture during the subsequent winter and spring. Should two wet years occur in succession, it is possible that water managers will lose water due to insufficient storage capacity. In addition, dams with flood control restrictions may require reservoir draw-down in the autumn/winter that could also lead to water supply losses if releases during AT breeding are restricted.
- Third, water not released from a reservoir before the AT breeding season is likely to be at least partially lost to evaporation. Shallow reservoirs are particularly vulnerable to evaporation losses.<sup>38</sup>

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These assumptions result in a conservative (i.e., more likely to overstate than understate) estimate of the cost of foregone water releases. Thus, these assumptions are appropriate for the upper-bound estimate of costs. Additional research would be required to refine the assumptions. Further discussion of these assumptions is presented in the *Caveats* section below.

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Dams possess a varying degree of operational flexibility. Because the EPS analysis relies on historical dam release data, water managers' reactions to potential changes in dam operations are not accounted for. Discussions with water managers indicate that in some cases, water releases can be conducted over the winter, thus avoiding conflicts with the AT breeding season. To the degree that water managers are able to adapt to new operational guidelines, loss of the entire volume of water release expected during the AT breeding season will overstate the impacts of the potential future management regulation.

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To account for varying degrees of operational flexibility, EPS assumes that 50 percent of the water volume expected to be released during the breeding season will require replacement. The 50 percent assumption represents moderate operational flexibility, the midpoint between zero operational flexibility and perfect operational flexibility. Zero operational flexibility implies that water managers are unable to conduct water releases expected to occur during the breeding season at a different time. Perfect operational

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<sup>37</sup> Personal Communication with Gary Hildebrand, Los Angeles County Department of Public Works, Dam Operations, April 1, 2004.

<sup>38</sup> Personal Communication with Larry Campbell, Senior Right of Way Agent/Environmental Analyst, Helix Water District, March 24, 2004.

flexibility suggests that water managers can conduct water releases expected to occur during the breeding season at a different time. Because it is extremely difficult to substantiate this assumption without additional research, EPS presents the result of sensitivity analysis of this assumption in the *Caveats* section below.

## NO CONTROLLED RELEASE/SUBSTITUTE WATER SOURCE

1170 Personal communication with the Carlsbad FWO Special Assistant to the Field Supervisor indicates that the Service may recommend that dams currently incapable of controlled release be retrofitted for such capabilities in order to provide in-stream flows to support AT breeding.<sup>39</sup> EPS has identified five dams that currently do not release water to AT habitat except when spills from the dams occur during large storm events (see **Table 15**).

1180 Retrofitting/modifying these dams to allow controlled release would be an expensive capital improvement. Construction of inlet/outlet works and pumping/control infrastructure can cost between \$1 million and \$75 million.<sup>40</sup> It is possible that a pumping solution that does not require dam modifications could reduce costs significantly. This analysis uses an estimate of \$10 million as the capital outlay necessary to establish controlled release capabilities at currently unequipped dams. The equivalent annual payment required to support this capital improvement is calculated to be \$650,500 based on a 30 year loan at 5 percent interest.<sup>41</sup>

In addition to infrastructure costs, EPS calculates the cost associated with replacing the water requested by the Service to support AT habitat. EPS assumes that natural flows are not recaptured for consumptive use (see the *Caveats* section below for further discussion of this assumption). To estimate natural flow levels, EPS examines available historical data sources:

- Streamflow data collected by gauging stations above the dam;
- Runoff data collected at the dam; and
- 1190 • Streamflow data collected by gauging stations in comparable streams.

Acre foot (AF) estimates of in-stream water allocation expected during the AT breeding season are generated from the above data sources. Current water replacement costs are applied to AF estimates to calculate total water replacement costs.

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<sup>39</sup> Personal Communication with Ray Bransfield, Section 7 Coordinator, Ventura FWO, March 30, 2004.

<sup>40</sup> Based on review of inlet/outlet works and pumping/control infrastructure cost estimates found online. Personal communication with John Laboon, USBR, Waterways and Concrete Dams Division, April 14, 2004, indicates that retrofitting is likely possible but that the cost of such a project depends on dam location, design, and construction materials. Mr. Laboon notes that there may be a pumping solution that does not require any dam modification.

<sup>41</sup> A 30 year term and 5% rate of interest reflects water managers' cost of borrowing funds for infrastructure. Personal communication with John Dickenson, United Water Conservation District, March 29, 2004.

## CONTROLLED RELEASE/NO SUBSTITUTE WATER SOURCE

1200 The Pyramid Lake reservoir, operated by the California State Department of Water Resources (DWR), releases water through Piru Creek to the United Water Conservation District (UWCD). Piru Creek currently represents the only source of water available to UWCD, and this water conveyance is subject to an operational agreement with the Service designed to protect the AT.<sup>42</sup> Specifically, DWR has entered an agreement with the Service that stipulates a flow regime that will not jeopardize the AT.<sup>43</sup> Although this agreement will expire in 2005, a similar long-term agreement is anticipated.

1210 EPS analyzes the potential for the current Piru Creek operating agreement to limit UWCD's ability to expand water flows in the future. Specifically, the analysis considers the possibility that UWCD will seek additional water (by acquiring water contracts or "entitlements" from water wholesalers) to meet future demand that will exceed the existing Piru Creek flow regime agreement. Given additional water contracts, UWCD may need to construct infrastructure to avoid water conveyance through Piru Creek that is detrimental to AT habitat.<sup>44</sup> To estimate the upper-bound cost impact of AT conservation measures, EPS examines the cost of the additional infrastructure (i.e., a pipeline) that would be required to convey water to UWCD without use of Piru Creek.

## NO CONTROLLED RELEASE/NO SUBSTITUTE WATER SOURCE

1220 Metropolitan Water District of Southern California (Metropolitan) releases Colorado River Aqueduct water to Coachella Valley Water District (CVWD) and Desert Water Agency (DWA) via the Whitewater River. Currently, the rate of water release from the Colorado River Aqueduct cannot be controlled to avoid or minimize impacts to the AT. Additionally, no substitute for the Colorado River Aqueduct water exists. Accordingly, EPS examines the cost of infrastructure that would be required to convey water to CVWD and DWA without use of the Whitewater River AT CH reach. This infrastructure is likely to be necessary to provide water without habitat impacts.<sup>45</sup>

## CALCULATION OF ECONOMIC IMPACTS

The calculation of economic costs due to investments in infrastructure and modified flow regime vary greatly depending on the water agency/district in question. A detailed description of the assumptions and methodology used to estimate the cost impact on each of the 12 water management areas potentially regulated by the Service is provided in **Appendix C**. A summary of the analysis and impact is provided in **Table 17**.

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<sup>42</sup> These discussions have occurred in the context of Federal Energy Regulatory Commission licensing.

<sup>43</sup> Note that the Service/DWR agreement covers March 2004 through March 2005. No historical costs are calculated.

<sup>44</sup> Personal communication with John Dickenson, United Water Conservation District, March 29, 2004.

<sup>45</sup> Personal communication with Dan Ainsworth, General Manager, Desert Water Agency, March 18, 2004 and personal communication with Dan Parks, Coachella Water District, March 18, 2004.

**Table 17**  
**Summary of Upper-Bound Cost Analysis**  
**Economic Analysis of Critical Habitat Designation for the Arroyo Toad**

Affected Activity CH / EH Unit	Description of Project Modification Cost	Annual Capital Cost (A)	Change in Water Supply (1)		Water Replacement Cost (\$/AF) (C)	Annual Impact C=(A)+(B*C)	Total Impact (3)
			Increased AF / Year (B)	Decreased AF / Year (2) (B)			
Releases from Pyramid Lake to Piru Crk. (CH Unit 5)	Pipeline construction to avoid release into Piru Crk.	\$3,000,000	N/A	N/A	N/A	\$3,000,000	\$14,577,817
Releases from Jameson Lake to Santa Ynez Rvr. (CH Unit 3)	Controlled release retrofit & replacement for flow to Santa Ynez	\$650,500	1,568	N/A	\$2,305	\$4,264,740	\$20,723,533
Releases from Castaic Lake to Castaic Crk. (EH Unit 6)	Controlled release retrofit cost	\$650,500	N/A	N/A	N/A	\$650,500	\$3,160,957
Releases from Big Tujunga Dam to Big Tujunga Crk. (CH Unit 7)	Replacement cost for reduced flow to Big Tujunga Crk.	N/A	N/A	3,161	\$480	\$1,517,040	\$7,371,711
Diversion of San Luis Rey Rvr. at the La Jolla Indian Reservation (CH Unit 14)	Replacement cost for increased flow to San Luis Rey Rvr. (4)	N/A	3,507	N/A	\$460	\$1,657,067	\$8,052,138
Releases from Loveland Rsrvr. to Sweetwater Rvr. (CH Unit 18)	Replacement cost for reduced flow to Sweetwater Rvr.	N/A	N/A	784	\$500	\$392,000	\$1,904,835
Releases from Colorado Rvr. Canal to Whitewater Rvr. (CH Unit 23)	Pipeline construction to avoid release into Whitewater Rvr.	\$400,000	N/A	N/A	N/A	\$400,000	\$1,943,709
Releases from El Capitan Rsrvr. to San Diego Rvr. (CH Unit 17)	Controlled release retrofit & replacement for increased flow to San Diego Rvr.	\$650,500	7,181	N/A	\$480	\$4,097,380	\$19,910,286
Releases from San Vicente Rsrvr. to San Vicente Crk. (CH Unit 17)	Controlled release retrofit & replacement for increased flow to San Vicente Crk.	\$650,500	2,066	N/A	\$480	\$1,642,180	\$7,979,800
Releases from Morena Rsrvr. to Cottonwood Crk. (CH Unit 19)	Replacement cost for reduced flow to Cottonwood Crk.	N/A	N/A	317	\$480	\$151,920	\$738,221
Releases from Sutherland Lake to Santa Ysabel Crk. (CH Unit 16)	Controlled release retrofit & replacement for increased flow to Santa Ysabel Crk.	\$650,500	2,793	N/A	\$480	\$1,991,140	\$9,675,492
Releases from Cuyamaca Rsrvr. to San Diego Rvr. (CH Unit 17)	Replacement cost for reduced flow to San Diego Rvr.	N/A	N/A	800	\$473	\$378,164	\$1,837,599
<b>CH TOTAL</b>		\$6,002,000	17,115	5,061		19,491,630	94,715,140
<b>Adjusted Total (5)</b>		<b>\$3,001,000</b>	<b>8,558</b>	<b>\$2,530</b>		<b>\$9,745,815</b>	<b>\$47,357,570</b>
<b>EH TOTAL</b>		\$650,500	N/A	N/A		\$650,500	\$3,160,957
<b>Adjusted Total (5)</b>		<b>\$325,250</b>	<b>N/A</b>	<b>N/A</b>		<b>\$325,250</b>	<b>\$1,580,478</b>

(1) Represents the increase or decrease in acre feet (AF) of water released from an upstream supplier reservoir in order to mimic natural flows.

(2) To account for varying degrees of operational flexibility to meet natural flow requirements, EPS assumes 50% of expected water volume will be replaced.

(3) Represents present value of future costs from year 2004 through 2025 discounted at 7 percent.

(4) Foregone hydropower revenue is equal to \$45,600. This figure is included in the Total Annual Impact field.

(5) Reduced by 50% since not more than half of the events are likely to occur. At this point in time, it is impossible to determine which water management areas the Service will pursue.

1230 As shown in **Table 17**, the upper-bound annual water supply-related cost impacts per water management area range from \$152,000 to \$4.3 million. The total annual impact per water management area equals the sum of potential annual infrastructure investment costs (column A) and total annual water replacement costs. Water replacement costs are calculated as the anticipated reduced water supply multiplied by the current cost of replacement water (column B x column D).

1240 The total impact across all units is adjusted to account for the fact that only a portion of the water management areas will be required to modify their flow regimes. The Service has stated that flow regime modifications will be sought in high-priority areas if the continued existence of the species is threatened in those areas. This analysis estimates the total cost of AT protection on water supply is likely to be \$9.75 million annually (in CH), or 50 percent of the \$19.5 million presented in **Table 17**. The assumption that 50 percent of the potential water impacts will be incurred is evaluated using sensitivity analysis presented in the *Caveats* section below.

## CONSUMER SURPLUS

For the purposes of this analysis it is assumed that the reduced consumer surplus attributable to the impact of AT protection on water supply is equal to the total cost impact estimate of \$9.75 million annually shown in **Table 17**. This conclusion is based on the following three considerations:

- 1250 1. **Full cost increases passed on to consumers (end-users):** The analysis assumes that the full cost increases due to the infrastructure investments and flow regime changes will be passed on the water consumers. Conversations with water managers generally confirm this assumption. However, to the extent that water agencies/districts absorb these cost burdens, the economic impacts may be mitigated.
- 1260 2. **Demand is perfectly inelastic:** The analysis assumes that the demand for water is perfectly inelastic, meaning that a change in water price has no impact on the quantity of water demanded.<sup>46</sup> Thus, increases in the price of water will reduce consumer surplus by the price increase multiplied by the quantity of water demanded. That is, the loss in consumer surplus is equal to the total cost impact,

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<sup>46</sup> Inelastic demand is used as a simplifying assumption. In reality, as the price of water increases, consumers reduce water consumption associated with marginal activities (e.g., watering lawns). More in-depth analysis is required to evaluate the true price-elasticity of demand for water in Southern California. Studies of urban water demand elasticity in the western U.S. generally confirm that demand for water is very inelastic. See Howitt R.E. (2003) "Some Economic Lessons from Past Hydrological Projects and Applications to the Ebro River Transfer Proposal", *International Journal of Water Resources Development*, Vol. 19:3, September.



roughly \$9.75 million annually. To the extent that the price elasticity of demand for water is less than perfectly inelastic and consumers adopt water conservation strategies, estimates of consumer surplus loss are over-stated.

- 1270 3. **Water prices in adjacent markets are unaffected:** Finally, the analysis assumes that the increase in the quantity of water demanded due to AT protection is unlikely to change the price of water in wider California water markets. The upper-bound impact analysis suggests that 8,560 acre feet of water per year may be required as a result of AT protections (note that this assumes conservation measures are undertaken at half of the sites identified). Coastal areas in California receive most of their water from the SWP and the Colorado River. In average water years, these water distribution systems provide roughly four million acre feet of water. Thus, a 8,560 acre foot change in supply is such an insignificant proportion of total supply that State and regional water markets will not be affected. As a result, the consumer surplus impacts will be limited to the local water management areas under consideration.

## 1280 OTHER ECONOMIC COSTS

### **Recreation**

Modification of water flow regimes may also have an impact on recreation-related activities. In some areas where controlled releases have kept springtime flows artificially high, a reduction in controlled release volume during the AT breeding season may adversely affect recreation. For example, a Rainbow Trout fishery in Piru Creek has benefited from above-natural flows. DWR is currently researching the effect of requirements to protect the AT on the fishery and recreational use of the fishery. Additionally, natural flows to Castaic Lagoon help support water sports such as water skiing. Thus, increased releases from Castaic Lagoon to Castaic Creek might impact recreation on the Lagoon. Due to uncertainty and data limitations, these impacts are not monetized in this analysis.

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### **Consultation Costs**

Water managers will likely experience an administrative cost burden associated with AT protection. This cost burden includes document preparation, meetings, and negotiations with the Service. The estimated additional consultation cost due to the proposed AT designation is based on 1 historical formal consultation and 6 future formal consultations.<sup>47</sup> Please see **Appendix F** for additional information regarding consultation costs.

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<sup>47</sup> The estimated number of future formal consultations assumes formal consultation on one half of the potentially affected water management areas.

## REGIONAL ECONOMIC IMPACTS

- 1300 In addition to reduced consumer surplus, an increase in the price of water may have a ripple effect through the economy by reducing the purchasing power of County households and increasing business production costs. The total impact of increased water prices can be estimated using an input/output (I/O) modeling framework developed by the Minnesota IMPLAN Group, Inc. (MIG) and based on industry data collected by the US Department of Commerce, Bureau of Economic Analysis. An I/O model traces the linkages between various sectors of a regional economy to determine potential change in employment brought about by given change in the demand for goods and services.
- 1310 A calculation of the potential reduced output and employment due to increased water prices is provided in **Tables 18** and **19** by County. As shown, the increase in water prices has the potential to result in a total of 82 lost jobs and \$10.2 million in reduced output over the five counties with reservoirs affecting AT habitat. This calculation assumes that the total cost impacts are passed on to local consumers in the form of higher water prices. The maximum impact varies by County with San Diego potentially experiencing the largest impact, followed by Ventura, Santa Barbara, Los Angeles, and Riverside, respectively. As noted above, the total impact is estimated to be one-half of the maximum potential in each County since the flow regime modifications will not occur in all water management areas. The potential for increased employment
- 1320 associated with water system infrastructure improvements is not accounted for here.

The employment and output estimates provided in **Tables 18** and **19** are based on the following series of calculations and assumptions (supporting information is provided in **Appendix D**):

1. **Estimated distributional impact of water supply by industry:** The total economic cost impact calculated in **Table 17** is allocated across five sectors that constitute the entirety of water demand: (1) households, (2) retail, (3) State and local government, (4) agriculture, and (5) all other economic sectors. These allocation assumptions are based on data from MIG (see Appendix **Table D-2**). Assuming 100 percent of the economic costs are passed on the consumers in the form of higher water prices, these sectors will experience an increase in cost as calculated in **Table 18**.
2. **Estimated reduction in household expenditures:** Household expenditures are assumed to decrease as a result of increased water prices for a variety of reasons. First, households themselves will experience a decline in their purchasing power by an amount equal to the increase in water price. Second, businesses that use water as an input in their production process will experience and increase in costs. These increased costs are likely to be passed on to consumers in the form of higher prices (again, to the extent that businesses absorb these costs, local economic impacts may be mitigated). Given that a portion of the output produced in each county is consumed by local residents, household income will

**Table 18**  
**Water Supply Impact by Industry Sector**  
**Economic Analysis of Critical Habitat Designation for the Arroyo Toad**

County & CH/EH Unit	Annual Cost (1)	Water Consumption By Sector (2)					Impact By Sector				
		Households	Retail	State/Local Gov't	Agriculture	All Other Sectors	Households	Retail	State/Local Gov't	Agriculture	All Other Sectors
<b>Ventura (CH Unit 5)</b>	\$3,000,000	66%	1%	6%	7%	20%	\$1,992,744	\$44,661	\$165,631	\$209,654	\$587,310
<b>Santa Barbara (CH Unit 3)</b>	\$4,264,740	25%	1%	3%	3%	68%	\$1,056,999	\$22,122	\$127,680	\$137,491	\$2,920,449
<b>Los Angeles (CH Unit 7)</b>	\$1,517,040	64%	1%	7%	0%	28%	\$971,056	\$19,195	\$99,961	\$1,526	\$425,302
<b>Riverside (CH Unit 23)</b>	\$400,000	67%	1%	8%	3%	20%	\$269,539	\$5,637	\$33,000	\$11,451	\$80,373
<b>San Diego</b>											
CH Unit 14	\$1,657,067	68%	1%	6%	1%	23%	\$1,131,231	\$23,327	\$105,572	\$12,025	\$384,912
CH Unit 16	\$1,991,140	68%	1%	6%	1%	23%	\$1,359,293	\$28,029	\$126,855	\$14,449	\$462,513
CH Unit 17	\$6,117,724	68%	1%	6%	1%	23%	\$4,176,391	\$86,120	\$389,760	\$44,395	\$1,421,058
CH Unit 18	\$392,000	68%	1%	6%	1%	23%	\$267,607	\$5,518	\$24,974	\$2,845	\$91,056
CH Unit 19	<u>\$151,920</u>	68%	1%	6%	1%	23%	<u>\$103,711</u>	<u>\$2,139</u>	<u>\$9,679</u>	<u>\$1,102</u>	<u>\$35,289</u>
<b>Subtotal</b>	\$10,309,850						\$7,038,233	\$145,133	\$656,840	\$74,817	\$2,394,828
<b>CH Total</b>	\$19,491,630						\$11,328,570	\$236,748	\$1,083,111	\$434,939	\$6,408,262
<b>CH Adjusted Total</b>	\$9,745,815						\$5,664,285	\$118,374	\$541,556	\$217,469	\$3,204,131
<b>Los Angeles (EH Unit 6)</b>	\$650,500	64%	1%	7%	0%	28%	<u>\$416,385</u>	<u>\$8,231</u>	<u>\$42,863</u>	<u>\$654</u>	<u>\$182,368</u>
<b>EH Total</b>	\$650,500						\$416,385	\$8,231	\$42,863	\$654	\$182,368
<b>EH Adjusted Total</b>	\$325,250						\$208,192	\$4,115	\$21,431	\$327	\$91,184

(1) See Table 17 for impact calculations.

(2) Shows how water consumption in the County is distributed by sector, based on data from Implan.

**Table 19**  
**Water Supply Impact on Regional Output and Employment**  
**Economic Analysis of Critical Habitat Designation for the Arroyo Toad**

County & CH Unit	County Consumption Factor (1)				Household Multiplier (2)		Total Impact (3)	
	Households	Retail	State/Local Gov't	All Other Sectors	Employment	Output	Employment	Output
<b>Ventura (CH Unit 5)</b>	100%	100%	100%	25%	10.9	\$1,310,000	26	\$3,146,983
<b>Santa Barbara (CH Unit 3)</b>	100%	100%	100%	30%	11.1	\$1,342,000	24	\$2,850,653
<b>Los Angeles (CH Unit 7)</b>	100%	100%	100%	37%	11.2	\$1,483,000	14	\$1,850,989
<b>Riverside (CH Unit 23)</b>	100%	100%	100%	15%	10.8	\$1,286,000	3	\$414,027
<b>San Diego</b>								
CH Unit 14	100%	100%	100%	35%	11.1	\$1,389,000	16	\$1,943,290
CH Unit 16	100%	100%	100%	35%	11.1	\$1,389,000	19	\$2,335,068
CH Unit 17	100%	100%	100%	35%	11.1	\$1,389,000	57	\$7,174,433
CH Unit 18	100%	100%	100%	35%	11.1	\$1,389,000	4	\$459,710
CH Unit 19	100%	100%	100%	35%	11.1	\$1,389,000	1	\$178,161
<b>Subtotal</b>							97	\$12,090,663
<b>CH Total</b>							164	\$20,353,315
<b>CH Adjusted Total</b>							82	\$10,176,657
<b>Los Angeles (EH Unit 6)</b>	100%	100%	100%	37%	11.1	\$1,483,000	6	\$793,696
<b>EH Total</b>							6	\$793,696
<b>EH Adjusted Total</b>							3	\$396,848

(1) Represents the estimated proportion of the total increase in water price by sector that is passed on to households in the County (as apposed to passed-on to consumers outside the County).

(2) Employment output multipliers estimates the change in employment and output per million dollar change in final household demand. It includes both direct, indirect, and induced affects.

(3) The calculation assumes that the reduction in household spending equals the reduced purchasing power brought about by increased water prices (e.g. the marginal propensity to consume is 1.0).

again decline by an amount proportional to these price increases. **Table 19** estimates the proportion of county output consumed locally, based on data from MIG.

- 1350      3. **Derive household expenditure multiplier and output/employment impact:** The total impact on county output and employment is estimated based on economic multipliers provided by MIG (see Appendix **Table D-1**). The analysis assumes that there is a 1 to 1 relationship between reduced household purchasing power due to increased water prices and household expenditures.

It is important to note that the potential county-wide employment and output impact described herein is not a measure of economic efficiency and thus should not be added to the consumer surplus impacts calculated in **Table 17**.

## CAVEATS TO WATER IMPACT ANALYSIS

- 1360      Given the complexity of water systems, water management, and hydrology in Southern California, it is necessary to make simplifying assumptions to estimate the impacts of AT conservation efforts on water supply. Numerous conversations with water managers indicate that water losses associated with potential operational changes related to AT conservation is a real concern. Water managers cite infiltration (i.e., seepage of water into the ground), lost storage capacity, and evaporation as reasons for lost water supply.

- 1370      Furthermore, in water management areas where water releases may be curtailed during the AT breeding season, it is difficult to determine if water managers can conduct releases before or after the breeding season without significant water supply losses. Conversations with water managers indicate that operational flexibility can be limited.

In areas where additional infrastructure may be required, additional water supply options or AT conservation measures not considered by this analysis may exist. Again, this analysis relies heavily on information provided by water managers to determine upper-bound costs. It may be that lower-cost alternatives have not yet been identified.

- 1380      Finally, it is difficult to understand how water managers will anticipate reductions in the quantity of water demanded by their customers (e.g., will water managers promote water conservation in order to avoid replacing some of the water lost to AT conservation?). In calculating the upper-bound cost impact, the analysis assumes that the quantity of water demanded does not change with price. If water demand declines substantially as a result of price increases, the economic impacts would be ameliorated.

The assumptions described yield a conservative (i.e., more likely to overstate than understate) estimate of the upper-bound cost associated with AT conservation efforts on water supply. Nonetheless, these assumptions may be refined with additional research. **Table 20** identifies research questions concerning water systems, water management, and hydrology that would assist in the refinement of the water supply impact analysis.

**Table 20**

**Caveats to the Economic Analysis of Upper-Bound Water Impacts  
Economic Analysis of CHD for the Arroyo Toad**

<b>Assumptions Used to Calculate Water Loss</b>	
<b>Key Assumption</b>	<b>Additional Research Questions</b>
Water released for in-stream use by the AT is lost due to infiltration.	Hydrology: What percentage of the requested in-stream flow is expected to infiltrate groundwater aquifers? Water System: Is there ground-water infrastructure and regulation that allows for the recovery of water that infiltrates groundwater aquifers? Water System: Is there surface-water infrastructure that may capture water that is not lost to infiltration?
Water that cannot be released during the AT breeding season is stored until the following winter and results in lost storage capacity.	Water Management: Are there factors impeding water managers' ability to release water during summer/autumn months? Water Management: If water is released during summer/autumn months, what is the expected loss to infiltration and how does it compare to loss to infiltration during the breeding season? Water Management/Water System: If water is not released during summer/autumn months, can managers store it until needed and how would such storage affect reservoir operations (e.g., flood controls)?
Water that cannot be released during the AT breeding season is lost to evaporation	Water Management: Evaporation is only likely to increase due to AT conservation measures if reservoir storage would have been substantially decreased or emptied during the AT breeding season. Is this true in any of the potentially affected water management areas?
<b>Assumptions Used to Calculate the Reaction to Water Loss</b>	
<b>Key Assumption</b>	<b>Additional Research Questions</b>
The analysis assumes that the elasticity of demand for water is perfectly inelastic.	Water Management: How much water would managers replace based on their expectation of future demand changes? Would water managers replace less than 100 percent of the water lost and/or promote water conservation? Are there water uses that water managers know will no longer occur given higher water prices?
The analysis relies on water replacement options identified by water managers.	Water Management: Are additional sources of water (e.g., desalinization) possible alternatives to water replacement methods identified (i.e., water purchases/transfers)?

## SENSITIVITY ANALYSIS

1390 As described above, EPS assumes that 50 percent of the water volume expected to be  
released during the breeding season will require replacement. This assumption  
addresses the possibility that water managers will avoid impacts by conducting water  
releases outside of the breeding season. In addition, EPS assumes that in total, 50  
percent of the potential water impacts will be incurred. This assumption accounts for  
the fact that the Service is unlikely to pursue changes in water operations in all areas  
where EPS identifies AT conservation measures as a possibility. Both 50 percent  
assumptions are realistic but difficult to defend quantitatively. In order to evaluate the  
effect of the 50 percent assumptions, EPS conducts a sensitivity analysis. The sensitivity  
analysis estimates the total upper-bound cost of AT conservation on water supply under  
1400 a “low-low” scenario in which the two 50 percent assumptions are decreased to 25  
percent and a “high-high” scenario in which the two 50 percent assumptions are  
increased to 75 percent. **Table 21** presents the results of the sensitivity analysis.

Results of the sensitivity analysis indicate that estimated impacts to water supply are  
highly responsive to assumptions regarding operational flexibility and the percentage of  
water management areas that undertake flow regime modifications for the AT. As  
described in **Table 21**, the low-low scenario yields an upper-bound cost estimate of  
approximately \$22 million, a 53 percent reduction in cost compared with the midpoint  
estimate. The high-high scenario produces an upper-bound cost estimate of roughly \$75  
1410 million, a 59 percent increase over the midpoint estimate.

**Table 21**  
**Sensitivity Analysis of Water Impact Assumptions**  
**Economic Analysis of Critical Habitat Designation for the Arroyo Toad**

Scenario	Percentage of Water Releases Foregone (1)	Percentage of Water Management affected by AT Conservation (2)	CH Cost Estimate (3)
Low-Low	25%	25%	\$22,197,239
Midpoint	50%	50%	\$47,357,570
High-High	75%	75%	\$75,480,992

(1) This assumption applies to water management areas with controlled release capability and access to an existing substitute water source. The assumption is made to account for flexibility in water system management (i.e., water releases foregone during the breeding season will occur outside of the breeding season).

(2) This assumption accounts for the fact that only a portion of the water management areas will be required to modify flow regimes.

(3) Represents present value of future costs from year 2004 through 2025 discounted at 7 percent.



## IV. ECONOMIC IMPACT TO OTHER PRIVATE ACTIVITIES

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The other private sector activities identified in this analysis that have been or will be affected by AT species or habitat protection include cattle grazing and stone and gravel mining. This chapter evaluates the potential economic impact of AT protection on these two activities.

### IMPACT TO CATTLE GRAZING

1420 This section describes past and future impacts to livestock grazing activities on Federal lands in AT CH areas. A review of historical consultations suggests that, for the most part, the Service has sought the implementation of habitat protection measures that have not resulted in a reduction in total grazing activity. Although the potential for exceptions to this general rule are evaluated here, most of the past and future costs estimated in this analysis are based on AT avoidance measures rather than reduced grazing activity.

1430 Historical consultations suggest that AT habitat surveys, fencing, and development of new water sources are the most common project modifications requested for the AT. Habitat surveys determine the location of AT populations. Fencing prevents cattle from entering occupied riparian areas. Development of new water sources provides drinking water to cattle outside of occupied riparian areas. Survey costs are likely to be borne by the US Forest Service while fencing and water development costs are borne by ranchers.<sup>48</sup>

1440 There are five formal historical consultations regarding cattle grazing. The Service conducted two consultations with Cleveland National Forest, two consultations with San Bernardino National Forest, and a riparian species programmatic consultation that addressed grazing with Cleveland National Forest, the Los Padres National Forest (LPNF), the San Bernardino National Forest and Angeles National Forest. These consultations identify grazing allotments where specific AT protection measures have been and will be required.

Minimization measures described in the National Forest riparian species programmatic consultation include reductions in grazing pressure on three allotments located within the LPNF. Discussion with the LPNF Rangeland Management Specialist indicates that, to date, reductions in grazing pressure have not occurred on actively used allotments. However, the Sisquoc allotment (described in the riparian species programmatic as “presently in non-use status”) was abandoned by the occupant due, in part, to the cost of consultation and AT protective measures.<sup>49</sup>

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<sup>48</sup> Personal communication with Gary Montgomery, LPNF Rangeland Management Specialist, April 15, 2004.

<sup>49</sup> Ibid.

## CALCULATION OF ECONOMIC COSTS

1450 A summary of the historical and future economic impact on grazing activity is provided in **Table 22**. As shown, the historical costs of AT protection result from one or more of the following protective measures: (1) exclusion of AT habitat through fencing and the corresponding development of alternative water source, and (2) a habitat survey to determine if exclusion of AT habitat is necessary. Past and future impacts are identified using existing BOs. If the BO calls for habitat surveys, EPS assumes that surveying occurred in the past, and future costs will be incurred as a result of exclusion fencing. If the BO calls for exclusion fencing, EPS assumes that the fencing has been built and minimal fencing maintenance cost will be incurred in the future.

1460 EPS assigns a cost of \$10,000 to each habitat survey. According to the LPNF Wildlife Biologist, LPNF uses GS-5 level employees for occupancy surveys. At this government rate (approximately \$12 per hour), a team of three can survey for more than six weeks. Additionally, the \$10,000 figure is consistent with survey costs reported by other regulated public entities.

Information on typical fencing requirements for grazing is based on three LPNF allotments. These three allotments suggest an average fencing cost of \$50,000 based on an estimated average of 12,500 linear feet of fencing at \$4 per linear foot.<sup>50</sup> This average is used to estimate the cost for fencing for allotments for which information is available.

1470 In addition, water development is estimated to cost between \$5,000 and \$10,000.<sup>51</sup> Finally, fence maintenance costs are assumed to equal \$50,000 over the 21-year period considered (i.e., a life cycle of 21 years).

Based on its size, the Sisquoc allotment would have required approximately 103,000 linear feet of fencing. The total cost of AT conservation including water development and biological surveys would have been approximately \$422,475. Project proponents considered this amount cost prohibitive. In other words, the potential grazing revenue generated by the allotment did not justify this level of investment. Consequently, \$422,475 is assumed to be the maximum possible value of this grazing allotment and the economic cost associated with its loss (if the economic value was higher than \$422,475 presumably the AT protection investments would have been undertaken).

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As shown in **Table 22**, the historical and future cost of AT protection on grazing activity is estimated to be \$1,162,349 and \$681,177, respectively. In addition, approximately 20 past and 20 future consultations are estimated due to grazing and AT habitat. Consultation costs are calculated in **Appendix F**.

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<sup>50</sup> Based on estimated average fencing required for the South Fork La Brea, Potholes, and Lower Piru allotments as reported in the US Forest Service biological opinions for Los Padres.

<sup>51</sup> Personal communication with Gary Montgomery, LPNF Rangeland Management Specialist, April 15, 2004.

**Table 22**  
**Estimated Impact of AT Protection on Grazing Activities**  
**Economic Analysis of Critical Habitat Designation for the Arroyo Toad**

CH Unit	Allotment	National Forest	Affected Stream	AT Protections <sup>1</sup>		Estimated Costs	
				Historical	Future	Historical <sup>2</sup>	Future <sup>2</sup>
2	Sisquoc	Los Padres NF	Sisquoc Rvr.	Foregone Grazing	Foregone Grazing	\$77,195	\$179,734
2	South Fork La Brea	Los Padres NF	La Brea Crk.	Surveys / Fencing & Water	Fencing Replacement	\$132,047	\$26,336
5	Potholes	Los Padres NF	Piru Crk.	Fencing (2)	Fencing Replacement	\$52,576	\$26,336
5	Lower Piru	Los Padres NF	Piru Crk.	Fencing (2)	Fencing Replacement	\$22,963	\$26,336
5	Temescal	Los Padres NF	Piru Crk.	Fencing (2)	Fencing Replacement	\$61,252	\$26,336
9	Rouse	San Bernardino NF	Bautista Crk. & San Jacinto Rvr.	Surveys Only	Fencing & Water	\$11,449	\$31,604
15	Mendenhall	Cleveland NF	West fork of the San Luis Rey Rvr.	Fencing	Fencing Replacement	\$85,909	\$26,336
16	Pamo	Cleveland NF	Temescal Crk. & Santa Ysabel Crk.	No Action or Impact	No Action or Impact	\$0	\$0
17	El Capitan	Cleveland NF	Not Specified	Fencing	Fencing Replacement	\$85,909	\$26,336
17	Pine Hills	Cleveland NF	San Diego Rvr., Cedar Crk., & Boulder Crk.	No Action	Surveys / Fencing & Water	\$0	\$36,871
17	Witch Crk.	Cleveland NF	San Diego Rvr. Drainage, Witch Crk.	Fencing	Fencing Replacement	\$85,909	\$26,336
19	Red Top	Cleveland NF	Pine Crk., Hauser Crk., & Cottonwood Crk.	Surveys Only	Fencing & Water	\$18,385	\$31,604
19	Corte Madera	Cleveland NF	Cottonwood Crk. & Morena Crk.	Fencing	Fencing Replacement	\$85,909	\$26,336
19	Guatay	Cleveland NF	Pine Valley Crk.	Fencing	Fencing Replacement	\$85,909	\$26,336
19	Houser Crk.	Cleveland NF	Cottonwood Crk. & Hauser Crk.	No Action	Surveys / Fencing & Water	\$0	\$31,604
19	Indian Crk.	Cleveland NF	Indian Crk. & Pine Valley Crk.	Surveys Only	Fencing & Water	\$17,182	\$31,604
19	Laguna	Cleveland NF	Cottonwood Crk.	Surveys / Fencing & Water	Fencing Replacement	\$120,273	\$26,336
19	Morena	Cleveland NF	Cottonwood Crk.	Fencing	Fencing Replacement	\$85,909	\$26,336
19	Pine Valley	Cleveland NF	Pine Valley Crk. & Noble Crk.	Surveys / Fencing & Water	Fencing Replacement	\$120,273	\$26,336
22	Warm Springs	San Bernardino NF	Deep Crk.	Surveys <sup>3</sup>	On-going surveys <sup>3</sup>	<u>\$13,298</u>	<u>\$22,122</u>
<b>Total</b>						\$1,162,349	\$681,177

(1) Costs estimated at \$50,000 for fencing, \$10,000 for water development, and \$10,000 for biological surveys.

(2) Present value estimate obtained by discounted future costs and inflating historical costs at an annual rate of 7 percent. Cost associated with the consultation process are not included here.

(3) This is a once a year cattle crossing with annual surveys estimated to cost \$2,000 each. Fencing is not required.

## IMPACT TO THE MINING INDUSTRY

1490 In the past, several consultations have occurred related to mining activities and their potential impacts to the AT. Since the listing of the species on December 16, 1994, the Service has engaged in five formal consultations on sand and gravel mining-related activities, most of them through 404 permits. Sand and gravel mining occurs both inside river channels and on uplands and can impact the AT and its habitat by altering or disturbing riparian ecosystem through activities such as dredging and extracting, especially during in-channel mining. Most of the past consultations involved in-channel mining, which has become much less common in California's mining industry over the past decade.<sup>52</sup>

1500 To date, the Service conducted four formal consultations with the ACOE and one with the BLM. A brief summary of the five formal BOs conducted by the Service to date related to the potential impact of mining on the AT is provided below:

- Sand mining within Sweetwater River in San Diego County (overlaps with Unit 18): the BO was issued to ACOE in 1997, which addressed the issuance of a 404 permit to Sloan Canyon Sand Company that would last until 2017.<sup>53</sup>
- Construction of a levee and sand mining within San Luis Rey River in San Diego County (overlaps with Unit 14): the BO was issued to ACOE in 1997, which addressed the issuance of a 404 permit to H.G. Fenton Material Company (now operating as Hanson Aggregate Company) that would last until 2005.<sup>54</sup>
- 1510 • Sand and gravel mining within Santa Maria and Sisquoc Rivers in Santa Barbara and San Luis Obispo Counties (overlaps with Unit 2): the first BO was issued to ACOE in 1998, which addressed the issuance of a 404 permit to Coast Rock (now operating as Union Asphalt) and Kaiser that would last 25 years. This BO was considered a consultation on the "Master Plan" that address the overall project scope and phasing, and subsequent consultations were to be conducted per

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<sup>52</sup> Interview with the State Department of Conservation, Office of Mine Reclamation indicates that over the past decade, impacts of in-channel mining on river systems and their riparian habitat have been widely recognized by the permitting agencies. As such, in-channel mining involves much more scrutiny and restrictions from all of the regulatory agencies involved in the permitting process. As a result, number of in-channel mining activities has decreased significantly over the years (4/6/2004).

<sup>53</sup> Biological Opinion for the U.S. Army Corps of Engineers Permit No. 95-20244-TCD, Sloan Canyon Sand Mine Project, Sweetwater River, San Diego County, California (1-6-97-F-54), November 6, 1997; personal communication with personnel from San Diego County, Planning Department, 4/16/04.

<sup>54</sup> Biological/Conference Opinion on the H.G. Fenton Material Sand Mine and Levee (U.S. Army Corps of Engineers File No. 94-20871-ES) near Pala on the San Luis Rey River, San Diego County, California (1-6-95-F-36), July 3, 1997.

1520

five-year plan that would specify how the project would be implemented.<sup>55</sup> As such, the second BO was issued in 2002, which addressed the first five years of mining and reclamation activities.

- Sand and gravel mining in lands adjacent to the Santa Clara River in Los Angeles County (overlaps with Unit 6): the BO was issued to the BLM in 2001, which addressed the BLM's decision to permit mining to Transit Mixed Concrete Company.<sup>56</sup>

## HISTORICAL COSTS ASSOCIATED WITH MINING ACTIVITIES

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The historical costs associated with the aforementioned consultations are further described and estimated below. For the purpose of estimating administrative cost, the two formal consultations regarding Union Asphalt's mining operation within Santa Maria and Sisquoc Rivers are treated separately. However, because the consultations essentially dealt with the same project, project modification cost is estimated for the entire project, instead of per consultation. All of the historical costs occurred in areas proposed for CH.

### **Project Modification Costs**

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Past project modifications for mining activities involve various types of reclamation activities including wetland preservation through conservation easement, re-vegetation, removal of non-native species, creation of basins, and various riparian habitat restoration activities.<sup>57</sup> It is difficult to estimate the expected reclamation cost because they depend heavily on the sensitivity of the ecosystem in the mining region as well as the level of disturbance caused by different mining activities. However, under the provisions of the California Surface Mining and Reclamation Act, the California Department of Conservation requires mining operators to complete financial assurance, usually through a form of bond, before finalizing their permit. The bond amount is determined by the mining operator's estimate of reclamation cost, which is reviewed and approved by the State Department of Conservation. As such, the bond amount is representative of reclamation cost involved in each mining project.

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<sup>55</sup> Biological Opinion for Extraction of Sand and Gravel within the Santa Maria and Sisquoc Rivers, Santa Barbara and San Luis Obispo Counties, California (File Numbers 94-50249-TS [Coast Rock] and 94-50885-TS [Kaiser]) (1-8-96-F-61), August 17, 1998.

<sup>56</sup> Biological Opinion for the Transit Mixed Concrete Project, Soledad Canyon, Los Angeles County, California (6840 CA-063.50) (1-8-01-F-52R).

<sup>57</sup> Reclamation may occur on- or off-site before, during or after active mining. The actual timing and areas to be reclaimed depend on the sensitivity of the ecosystem and the level of disturbance expected from mining activities. In the event that mining results in take of endangered species, the mining operator may be required to create suitable habitat for the species off-site before mining begins or reclaim and enhance the original habitat once mining is complete.

1550 Except for Transit Mixed Concrete Company, all other mining operators involved in the past consultations have obtained mining permits and are currently known to be actively mining in their respective project areas. In 2002, Los Angeles County board of supervisor denied mining permit to Transit Mixed Concrete Company.<sup>58</sup> Several lawsuits have been filed involving the Service, City of Santa Clarita, BLM, the County and Transit Mixed Concrete Company (currently known as CEMEX).<sup>59</sup>

1560 It is unclear at this time which major issues caused the denial of the permit. However, interviews with the County staff indicate that a variety of factors, including environmental review procedures, water quality, and proximity to urban development, contributed to the ultimate denial of the permit. Although the presence of endangered species in the project area, including the AT, may have contributed to the denial of the permit, it is unclear at this point to what extent. Because various factors are involved, the portion of the mining operator's loss attributable to the AT, if any, is unknown.

1570 The other three mining companies involved in the past consultations have put up a bond in varying amounts based on their estimated reclamation costs. Based on the bond, it is estimated that the past consultations involved a total of approximately \$322,000 in costs in 2004 dollars (see **Table 23**).<sup>60</sup> Included in the estimate is the assumption that the reclamation costs incurred by the mining operators are equally attributable to all of the threatened or endangered species addressed in the consultations, since all of the species rely on riparian ecosystem. Therefore, the total bond amount divided by the number of species present represents the amount attributable to the AT.

It is also important to note that reclamation activities do not necessarily take place concurrently with mining. Some may reclaim a disturbed area early on while others may do so after all mining activities are complete. However, for the purpose of this analysis, all costs associated with reclamation activities outlined through the past consultations are treated as past costs that occurred in the year the BO was issued.

### **Administrative Costs**

1580 The historical AT-related administrative costs in the mining sector for activities in proposed AT habitat are based on five consultations since 1994, as calculated in **Appendix F**. Because all of the aforementioned consultations addressed other

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<sup>58</sup> California Department of Conservation, California Geological Survey/U.S. Geological Survey, *The Mineral Industry of California*, 2002.

<sup>59</sup> Personal Communication with Los Angeles County staff, April 13, 2004.

<sup>60</sup> Personal Communication with personnel from the State Department of Conservation, Office of Mine Reclamation, and San Diego County Planning Department, April 16, 2004.

**Table 23**  
**Calculation of Potential Impact of AT Protection on Historical and Future Mining**  
**Economic Analysis of Critical Habitat Designation for the Arroyo Toad**

Affected Unit	Mining Operator	Bond Amount (A)	# of Endangered Species (B)	Historical AT Related Costs			Estimated Future Consultations (3)	Projected Future AT Costs	
				Nominal Value (A)/(B)	in 2004 \$s (1)	Present Value (2)		in 2004 \$s (1)	Present Value (2)
2	Union Asphalt	\$871,439	4	\$217,860	\$257,544	\$386,505	2	\$214,525	\$113,634
18	Sloan Canyon Sand	\$100,445	3	\$33,482	\$39,581	\$63,558	2	\$214,525	\$113,634
14	Hanson Aggregate	\$62,586	3	\$20,862	\$24,662	\$39,602	2	\$214,525	\$113,634
6	Transit Mixed Concrete	n/a	n/a	n/a	n/a	n/a	2	\$214,525	\$113,634
13	Unknown	n/a	n/a	n/a	n/a	n/a	2	\$214,525	\$113,634
<b>Total</b>		<b>\$1,034,470</b>			<b>\$321,787</b>	<b>\$489,664</b>	<b>10</b>	<b>\$1,072,624</b>	<b>\$568,169</b>
<b>Average</b>		<b>\$344,823</b>			<b>\$107,262</b>	<b>\$163,221</b>		<b>\$214,525</b>	<b>\$113,634</b>

(1) Inflation rate based on west urban metro area consumer price index provided by U.S. Department of Labor Bureau of Labor Statistics.

(2) Based on 7 percent discount rate.

(3) Based on a historical average of 1 consultation per unit for every ten years.

endangered species in the proposed action areas, the estimate includes an assumption that the administrative costs incurred by the involved parties are equally attributable to all of the threatened or endangered species addressed in the consultations.

## FUTURE IMPACTS ON MINING ACTIVITIES

1590 Currently, no mining projects are proposed in any of the proposed CH. Furthermore, most of the consultations in the past involved 404 permits, which would be required for in-channel mining. In-channel mining activities have been decreasing in recent years due to regulatory scrutiny and this trend is expected to continue.<sup>61</sup> However, EPS makes a conservative assumption that the past rate of consultation will continue in the future. Thus, EPS estimates that the service will engage in one formal consultation every two years, or a total of 10 formal consultations by 2025 (based on the past rate of five formal consultations since 1994). Although it is difficult to tell where future consultation associated with mining activities would occur, it is highly plausible that new mining projects could occur in current mining areas (i.e., Units 2, 6, 15 and 18). In addition to those units, the Service believes mining activities may occur in Unit 13. No future mining activities are expected in AT habitat proposed for exclusion.

### 1600 **Project Modification Costs**

As discussed earlier, the reclamation requirements can vary significantly by proposed activities and location. Because no known projects are in the horizon, it is almost impossible to forecast the level of reclamation that would be involved in future mining projects that are subject to section 7 consultations. As such, EPS takes the average bond amount for the AT (i.e., \$107,000) based on the past mining projects the Service has consulted, and applies the average to all future consultations. Thus, future consultations are likely to result in total project modification costs of \$568,000 (2004 dollars) in present value terms (see **Table 23**).

### **Administrative Costs**

1610 As noted above, it is estimated that the Service will conduct a total of 10 formal consultations regarding sand and gravel mining activities by 2025, with costs calculated in **Appendix F**.

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<sup>61</sup> Personal communication with a biologist from Carlsbad FWS, April 13, 2004.



## V. ECONOMIC IMPACT TO PUBLIC PROJECTS AND ACTIVITIES

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This chapter evaluates the potential historical and future economic impact of AT protection on a range of public projects and activities. The analysis focuses primarily on future road projects, as the consultation history suggests it is likely to be the most significantly affected public activity. In addition, the analysis considers the potential impact of AT protection on military bases, other public infrastructure, fire management, border patrol, and research activities.

### IMPACT TO TRANSPORTATION PROJECTS

The AT BO history includes approximately 18 BOs on major road projects, the vast majority of which involve California Department of Transportation (Caltrans) projects. These consultations focus primarily on the development, expansion or widening of State highways and bridges. In general the BOs have sought AT avoidance and minimization measures during the construction process as well as restoration or replacement of damaged habitat. The consultations have not constrained the size or location of transportation projects and as such this analysis assumes that future project modifications related to AT protection will not impair regional mobility.

As part of this analysis, EPS solicited information from representatives of four out of the six Caltrans districts that intersect with the proposed AT CH (the Caltrans districts in Monterey and Santa Barbara were not contacted since no State projects are expected in these units). Caltrans provided a variety of information on the type and cost of project modifications that occur as a result of AT protection. However, for the most part, Caltrans personnel were unable to provide detailed estimates of future projects intersecting the AT CHD through 2025. Consequently, EPS supplemented the information provided by Caltrans with a model linking data on projected future road projects in CH and EH to associated future development.

### DESCRIPTION OF CALTRANS DISTRICT ACTIVITIES

A summary of formal consultations on historical transportation projects affected by AT conservation is provided **Table 24**. As shown, the present value of total historical costs associated with AT protection is estimated at about \$5.6 million. The cost estimates are based on the relevant BOs, information provided by Caltrans staff, and additional EPS research on similar project modifications conducted elsewhere.

**Table 24**  
**Historical Impact of AT Protection on Caltrans Road and Transportation Projects**  
**Economic Analysis of Critical Habitat Designation for the Arroyo Toad**

CH Unit	Project Name	Affected Stream	County	Year	AT Protections (1)	Cost Estimate (2)
4	Seismic Retrofit on Rt. 33 Bridges	Sespe Crk. and Matilija and Tule Crks.	Ventura	1996	Survey, Habitat restoration	\$18,900
6	Repairs to I-5 bridge over Santa Clara Rvr.	Santa Clara Rvr.	Los Angeles	2002	Survey, Habitat restoration, Land acquisition	\$365,223
10	San Juan Crk. Bridge replacement	San Juan Crk.	Orange	1996	Survey, Bio-monitoring, Habitat restoration	\$103,091
10	Extension of Antonio Parkway	San Juan Crk.	Orange	1997	Survey, Bio-monitoring, Habitat restoration	\$520,594
10	Rancho Potrero Leadership Academy Project	Trabuco Crk.	Orange	2002	Survey, Bio-monitoring, Habitat restoration	\$371,177
11	Emergency bridge repair work on I-5 at San Mateo Crk.	San Mateo Crk.	San Diego	2002	Habitat restoration	\$371,177
13	SR-79	Temecula Crk.	San Diego /Riverside	In Process	Bio-monitoring, Habitat restoration	\$76,000
14	Replacement of Hwy 395 bridge	Lower & Middle San Luis Rey Rvr.	San Diego	1995	Habitat restoration, Conservation easement	\$596,028
14	Replacement of Camino Del Rey bridge	Lower & Middle San Luis Rey Rvr.	San Diego	1996	Habitat restoration, Water pollution control project	\$557,036
14	Widening of shoulders along SR-76	San Luis Rey Rvr..	San Diego	1997	Bio-monitoring, Habitat restoration	\$520,594
14	Improvements to SR-76 drainage systems	San Luis Rey Rvr.	San Diego	1999	Bio-monitoring, Habitat restoration	\$454,707
14	Replacement of West Rincon Crk. bridge along SR-76	San Luis Rey Rvr.	San Diego	2000	Habitat restoration	\$424,960
14	Replacement of damaged culverts under SR-76	San Luis Rey Rvr.	San Diego	2002	No major AT protections	\$0
22	SR 138 Safety Realignment	Unknown	San Bernadino	2003	Survey, Bio-monitoring, Habitat restoration	<u>\$1,235,850</u>
<b>Total</b>						<b>\$5,615,338</b>

(1) Based on information from BOs and Caltrans staff.

(2) Historical costs are converted to a present value based on a 7% discount rate. Cost estimates provided by Caltrans staff and additional EPS research on similar activities/projects elsewhere.

1650 Two Caltrans districts also provided information on future projects likely to intersect with proposed AT CH. This information was used to substantiate the future impacts estimated through the EPS transportation project cost model. A summary of the future project information reported by Caltrans is provided below for the applicable districts:

**District 8 (San Bernardino and Riverside Counties)**

1660 Caltrans forecasts four projects intersecting AT habitat in San Bernardino and Riverside Counties. Projects covered by the Western Riverside County MSHCP are likely to include widening State Route 74 (an extension of the SR-74 widening activity currently being explored in Orange County) and the further widening of SR-79 and its bridges. These projects will impact tributaries flowing into San Juan Creek (Unit 10), Temecula Creek (Unit 13) and Arroyo Seco Creek (Unit 13). Mitigation costs associated with these two projects are estimated to total \$500,000 and \$250,000.<sup>62</sup>

In CH Unit 23, Caltrans forecasts a proposed 2-lane widening of Interstate-10 to a ten-lane facility. The project would impact the Whitewater River. Mitigation costs associated with this project are expected to be \$100,000.<sup>63</sup>

In CH Unit 22, the 4-lane widening of SR-138 is expected within the next ten years. The project will impact the Upper Mojave River, and is a combined effort between Caltrans, the City of Hesperia, and local developers. No cost estimates were available for this project.

1670 Also in CH Unit 22, Caltrans expects construction to begin by 2008 on the Mojave River Bridge along Interstate 15. The overall project will cost approximately \$7.3 million. Costs for mitigation measures for the AT are unknown at this time.<sup>64</sup>

**District 12 (Orange County)**

A bridge widening project in CH Unit 10 at San Juan Creek is likely within the next five to ten years. According to Caltrans personnel, a consultant is currently surveying for AT. If AT is found, Caltrans will develop a BA for the project. However, the timing of the project depends on the Agency's budget, which is currently unknown.<sup>65</sup>

**TRANSPORTATION PROJECT COST ANALYSIS**

1680 To supplement cost information provided by Caltrans, EPS projected the costs associated with road projects attributable to AT protection based on detailed information available in San Diego County. Specifically, using GIS data from SANDAG regarding projected future freeways, State highways and arterial roads, EPS examined the intersection of forecasted road projects in proposed CH and EH in San Diego to

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<sup>62</sup> Ibid.

<sup>63</sup> Ibid.

<sup>64</sup> Ibid.

<sup>65</sup> Personal Communication with Sylvia Vega, Caltrans District 12, April 8, 2004.

estimate the level of intersection that might occur in other counties. The results of this analysis are summarized in **Table 25** with the detailed analytical assumptions further described below.

- 1690      1. **Estimate future road miles in San Diego intersecting CH and EH.** SANDAG provides detailed GIS level projections of the number of road miles in CH and EH in San Diego County. This data, as evaluated by Ellis GeoSpatial, indicates that future San Diego County roads are likely to intersect CH Units 11, 12, 14, 16, and 19. A total of 6.2 miles of future roads are forecasted to be developed within CH and EH in San Diego County.
- 1700      2. **Estimate future road miles intersecting CH and EH in other counties.** EPS analysis of the SANDAG growth forecast indicates that San Diego County census tracts adjacent to CH and EH will experience development of approximately 208,000 acres of land between 2000 and 2025. To estimate miles of future roads in areas outside of San Diego County, EPS considers the ratio of road miles in CH and EH to future land development in intersecting census tracts in San Diego. This ratio is applied to the future development acreages in census tracts adjacent to CH and EH units located outside of San Diego County. Projected development occurring in census tracts intersecting more than one CH or EH Unit is divided equally among the adjacent Units to avoid overestimating future road construction. Estimates of road miles by CH Unit and EH Unit are provided in **Table 25**.
- 1710      3. **Estimate AT restoration cost per road mile.** To estimate costs associated with future road miles expected to occur in CH and EH, EPS examines costs reported by Caltrans. Based on costs reported by District 8, EPS assumes that the impacted project area for each road lane is 82.5 feet wide. Based on the roads intersecting CH and EH in San Diego County, EPS estimates that the average new road intersecting CH and EH is 2.6 lanes wide. The average project area width (i.e., 82.5 feet x 2.6 lanes) is multiplied by estimated road miles in each CH and EH Unit to determine the expected project area in each CH and EH Unit.

1720      EPS assumes that habitat restoration will be required as offsetting compensation for impacts to AT habitat, an assumption consistent with historical consultations and information collected from Caltrans. This data suggests that on average the Service will request a restoration ratio of 2 to 1. Based on costs reported by District 8, EPS assumes that each acre of habitat restoration will cost \$13,125. Additionally, based on costs reported by District 8, EPS includes a cost of \$15,675 per acre for biological monitoring and \$50 per acre for AT surveys. All costs are spread evenly over 21 years (2004 through 2025) and discounted at 7 percent.

Based on the above methodology, the total future costs of AT protection on road projects is estimated to be about \$4.9 million in proposed CH and \$561,000 in proposed EH, as shown in **Table 25**. The CH units with the highest cost estimates generally correspond

**Table 25**  
**Estimated Future Impact of AT Protection on Road and Transportation Projects**  
**Economic Analysis of Critical Habitat Designation for the Arroyo Toad**

Unit	Estimated Road Miles (1)		Estimated Acres (2)		Habitat Restoration Cost (3,4)	
	In CH	In EH	In CH	In EH	In CH	In EH
1	0.0	0.0	0.0	0.0	\$0	\$812
2	0.0	0.0	0.2	0.0	\$4,265	\$0
3	0.0	0.0	0.1	0.0	\$1,945	\$0
4	0.0	0.0	0.0	0.0	\$0	\$0
5	0.1	0.0	2.9	0.0	\$65,103	\$0
6	0.2	0.2	5.2	5.4	\$116,436	\$122,028
7	0.1	0.0	2.7	0.0	\$59,865	\$0
8	0.0	0.1	0.8	3.7	\$18,416	\$83,132
9	0.0	0.2	0.3	5.9	\$6,121	\$132,123
10	0.6	0.0	14.7	0.0	\$331,446	\$1,093
11	3.0	0.0	73.5	0.0	\$1,660,536	\$0
12	0.7	0.0	17.4	0.0	\$392,795	\$0
13	0.5	0.3	12.1	6.5	\$274,167	\$146,469
14	1.0	0.0	25.1	0.0	\$565,691	\$0
15	0.0	0.0	0.0	0.0	\$0	\$0
16	1.5	0.0	37.7	0.0	\$852,174	\$0
17	0.0	0.0	0.0	0.0	\$0	\$0
18	0.0	0.0	0.0	0.0	\$0	\$0
19	0.0	0.0	0.0	0.0	\$0	\$0
20	0.2	0.0	5.9	0.0	\$133,890	\$0
21	0.1	0.0	2.1	0.0	\$46,315	\$0
22	0.5	0.1	11.7	3.4	\$264,356	\$75,741
23	<u>0.1</u>	<u>0.0</u>	<u>2.8</u>	<u>0.0</u>	<u>\$62,151</u>	<u>\$0</u>
<b>Total</b>	8.7	1.0	215.027	24.861	\$4,855,672	\$561,398

(1) Road miles in CH and EH based on San Diego GIS analysis and extrapolated to other areas based on forecasted future development.

(2) Estimated project area (in acres) calculated based on a project width of 215 feet.

(3) Habitat restoration costs are based on \$50 per acre survey cost, \$15,675 per acre bio-monitoring cost, and \$13,125 per acre of habitat restoration cost. Habitat restoration is conducted at a ratio of 2 to 1.

(4) Present value estimate obtained by discounting future costs at an annual rate of 7 percent.

to the information provided by Caltrans, as described above. In addition, projected administrative costs associated with eight consultations by 2025 are estimated in **Appendix F**.

## **IMPACT TO OTHER PUBLIC INFRASTRUCTURE**

1740 The AT BO history includes approximately 19 Formal BOs on utilities and other infrastructure projects. These consultations cover pipeline projects, water supply infrastructure projects, hydropower projects, bank stabilization projects, flood control projects, and communication (i.e., cable/fiber optic) projects. Despite the diversity of infrastructure projects, in general, the BOs have focused on the construction process as well as on restoration of damaged habitat. The BOs have not constrained the size or location of infrastructure projects and, as such, this analysis assumes that future project modifications related to AT protection will not impair the service capacity of infrastructure projects.

Estimates of historical costs associated with utilities and other infrastructure projects are detailed in **Table 26**. EPS solicited information from the regulated community regarding costs associated with AT protection. The City of Los Angeles, Department of Water and Power, EDAW (an environmental consulting firm), and the California Department of Water Resources provided cost data.

1750 Estimates of future costs associated with utilities and other infrastructure projects are presented in **Table 27**. To estimate future infrastructure projects and associated costs, EPS links historical consultations and costs to historical population growth. Specifically, the number of consultations and AT-related project costs are related to total population growth in the eight counties where CH and EH are proposed. Ratios of the number of consultations and AT-related costs to population are developed. EPS then uses forecasted population growth 2004 through 2025 to estimate future consultations and costs in the eight counties. EPS allocates costs to CH and EH units based on the forecasted level of development in Census tracts adjacent to each CH and EH Unit. In addition, projected administrative costs of associated with 62 consultations by 2025 are estimated in **Appendix F**.

## **IMPACT TO THE MILITARY**

This section evaluates the historical and future economic costs of the AT conservation activities on projects and activities at MCB Camp Pendelton (CH Unit 11), Fallbrook Naval Weapons Stations (CH Unit 12), and Fort Hunter Liggett (EH Unit 1). In all cases, the Service has proposed to exclude essential AT habitat regarded as mission essential to the military. Although economic costs are estimated for both excluded and included areas, potential impacts on military readiness is beyond the scope of this analysis.

**Table 26**  
**Historical Impact of AT Protection on Utility and Other Infrastructure Projects**  
**Economic Analysis of Critical Habitat Designation for the Arroyo Toad**

CH Unit	Project Name	Affected Stream	Year	AT Protections	Historical Cost (1)
<b>Pipeline Projects</b>					
10	Questar's Southern Trails Pipeline Project	San Juan River	2000	Survey, Bio-monitoring	\$108,403
<b>Water Supply Infrastructure Projects</b>					
14	Domestic Waterline Project, Rincon Indian Reservation	Paradise Creek, San Luis Rey River	1995	Survey, Bio-monitoring	\$152,041
14	Water System Infrastructure Improvements on the Pala Indian Reservation	San Luis Rey River	2001	Survey, Bio-monitoring, EPA funded AT research	\$101,311
14	Rincon Band of Mission Indians Water System Improvement Project	San Luis Rey River	2003	Survey, Bio-monitoring, Water discharge guidelines	\$88,489
10	Santa Margarita Water District Nondomestic Water Program Expansion Project	San Juan Creek	2003	Survey, Bio-monitoring, Habitat restoration	\$10,700
18	Sweetwater Reservoir Urban Runoff Diversion System	Sweetwater River	1996	Survey, Bio-monitoring, Habitat restoration	\$142,094
5	Maintenance of the Piru Creek Stream Gaging Station	Piru Creek	1998	Survey, Bio-monitoring	\$124,110
6	Maintenance of Two Gaging Stations in the Castaic Creek Watershed	Castaic Creek and Fish Creek	1998	Survey, Bio-monitoring	\$124,110
17	San Diego County Water Authority Emergency Water Storage Project	San Vicente Reservoir	1997	Survey, Bio-monitoring, Habitat restoration	\$132,798
<b>Power Projects</b>					
14	Replacement of the Rincon Penstock	Escondido Canal	2002	Survey, Bio-monitoring, Habitat restoration	\$228,980
6	Removal of Sediment from Basin 1 and Use of a Haul Road	Castaic Creek, upstream from Castaic Lake,	1996	Survey, Bio-monitoring	\$65,463
<b>Bank Stabilization Projects</b>					
11	Rock Fill	Cristianitos Creek	2000	Survey, Bio-monitoring, Habitat restoration	\$108,403
10	Construction of a Rock Gabion	San Juan Creek	1996	Survey, Bio-monitoring, Habitat restoration	\$142,094
6	Bank Protection	Castaic Creek	2002	Survey, Bio-monitoring, Conservation easement	\$94,683
<b>Flood Control Projects</b>					
6	Repair and Replacement of a Timber Revetment in Soledad Canyon	Santa Clara River	1994	Survey, Bio-monitoring	\$162,683
11 - 19	Regional General Permit For Routine Flood Control Maintenance in San Diego County	Numerous	1998	Survey, Bio-monitoring, Habitat restoration	\$124,110
14	Keys Creek Flood Improvement	Keys Creek	1998	Survey, Bio-monitoring, Habitat restoration	\$124,110
6	Ongoing Maintenance Activities at the Castaic Power Plant	Castaic Creek	1997	Survey, Bio-monitoring, Habitat restoration	\$132,798
<b>Communication Projects</b>					
Unknown	Fiber Optic Network, San Diego County to the California/Arizona State Line	not specified	2000	Survey, Bio-monitoring	\$108,403
Unknown	AT&T Cable Upgrade Project	not specified	1999	Survey, Bio-monitoring	<u>\$115,991</u>
<b>Total</b>					<b>\$2,391,776</b>

(1) Historical costs are converted to a present value based on a 7% discount rate. Cost estimates provided by the City of Los Angeles Department of Water and Power, EDAW, the California Department of Water Resources and additional EPS research on similar activities/projects elsewhere.

**Table 27**  
**Future Impact of AT Protection on Utilities and Other Infrastructure Projects**  
**Economic Analysis of Critical Habitat Designation for the Arroyo Toad**

CH / EH Unit	Estimated Future Consultations (1)		Future Cost Estimate (2,3)	
	In CH	In EH	In CH	In EH
1	0.00	0.01	\$0	\$524
2	0.06	0.00	\$2,753	\$0
3	0.03	0.00	\$1,255	\$0
4	0.00	0.00	\$27	\$0
5	0.61	0.00	\$27,071	\$0
6	1.42	1.39	\$63,143	\$61,809
7	0.73	0.00	\$32,465	\$0
8	0.22	0.22	\$9,987	\$9,987
9	0.02	1.60	\$1,107	\$71,097
10	4.52	0.01	\$200,920	\$593
11	0.88	0.71	\$39,082	\$31,477
12	0.56	0.51	\$24,954	\$22,571
13	3.34	1.77	\$148,681	\$78,877
14	3.92	1.56	\$174,625	\$69,258
15	1.62	0.00	\$72,035	\$0
16	3.93	3.52	\$174,784	\$156,440
17	3.77	2.35	\$167,907	\$104,554
18	4.38	1.23	\$194,826	\$54,621
19	6.49	5.85	\$288,864	\$260,182
20	1.63	0.00	\$72,609	\$0
21	0.56	0.00	\$25,117	\$0
22	0.92	0.92	\$41,074	\$41,074
23	<u>0.76</u>	<u>0.00</u>	<u>\$33,705</u>	<u>\$0</u>
<b>Total</b>	<b>40</b>	<b>22</b>	<b>\$1,796,990</b>	<b>\$963,062</b>

(1) The number of future consultations is estimated by linking historical population growth to the number of historical consultations and using projected future population growth through 2025 to predict future consultations. Consultations are allocated to CH and EH Units based on forecasted development in Census Tracts intersecting CH and EH units.

(2) Future costs are based on historical cost estimates and predicted using the same methodology as described for estimating future consultations

(3) Future costs are converted to present value based on a 7% discount rate.



## MCB CAMP PENDLETON

MCB Camp Pendleton provides training facilities for many active-duty and reserve Marine, Army, and Navy units, as well as national, State, and local agencies. More than 60,000 military and civilian personnel are employed at the base, and it is home to the 1<sup>st</sup> Marine Expeditionary Force, the 1<sup>st</sup> Marine Division, the 1<sup>st</sup> Force Service Support Group, and many tenant units, including elements of Marine Aircraft Group 39 and Marine Corps Tactical Systems Support Activity.

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The training exercises on MCB Camp Pendleton range from small isolated activities to those including several thousand personnel, and include infantry operations, amphibious landings, live fire operations and field maneuvers using wheeled and tracked vehicles. While the base contains housing developments and recreational areas, its main purpose remains military training for the foreseeable future.

The Service has designated 3,114 acres CH in MCB Camp Pendleton. The remaining MCB Camp Pendleton acres are located on mission-essential training areas of the base and have been proposed for exclusion under the section 4(b)(2) of the Act.

### 1790 **Economic Cost Estimate**

In 1995 the Service issued a formal BO associated with a consultation on Pendleton's Riparian and Estuarine Programmatic Conservation Plan. This BO described a number of RPMs designed to protect five listed species and their habitat, including the AT. The BO covered the following activities: (1) ongoing training activities and requirements, (2) planned training activities and requirements, (2) infrastructure maintenance, (3) construction projects, and (4) recreational programs. In addition, there have been 13 subsequent BOs for activities and projects at Pendleton not covered in this programmatic BO.

1800 A summary of the type of reasonable and prudent measures (RPMs) specified for the AT and an estimate of their historical and future cost is provided in **Table 28**. The cost and frequency assumptions are based on a variety of sources, including historical BOs, data from similar activities elsewhere, and discussions with Service and Pendleton staff.<sup>66</sup> However, the assumptions and calculations contained in **Table 28** have not been confirmed or verified by Pendleton staff.

As shown in **Table 28**, the historical cost of AT conservation activities at Camp Pendleton is estimated at about \$1.8 million, compared to \$1.4 million for future costs. The majority of these costs, or approximately 80 percent, is estimated to occur in essential AT habitat proposed for exclusion, based on discussion with the Service.

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<sup>66</sup> Jill Terp, Division Chief, Carlsbad FWO and Bill Berry, Environmental Security, MCB Camp Pendleton.

**Table 28**  
**Estimated Cost of AT Conservation Activities at Camp Pendleton**  
**Economic Analysis of Critical Habitat Designation for the Arroyo Toad**

Typical RPMs	Cost Estimation Factor	Cost Per Unit	Cost Allocation (1)		Historical Costs (2)		Future Costs (2)	
			Included Habitat	Excluded Habitat	Included Habitat	Excluded Habitat	Included Habitat	Excluded Habitat
<b>Habitat Enhancement / Replacement (3)</b>	3 acres/year	\$15,000 / acre	20%	80%	\$126,230	\$504,919	\$97,520	\$390,079
<b>Installation / Monitoring of Fencing</b>	2,000 linear Ft. / Year	\$4 /linear Foot	20%	80%	\$22,441	\$89,763	\$17,337	\$69,347
<b>Biological Monitoring</b>	1 /consultation	\$2,500 /consultation	20%	80%	\$9,818	\$39,271	\$7,585	\$30,339
<b>Run-off and Erosion Control Measures</b>	3 acres/year	\$2,000 / acre	20%	80%	\$16,831	\$67,322	\$13,003	\$52,011
<b>Toad Surveys / Studies</b>	1 /consultation	\$10,000 / survey	20%	80%	\$39,271	\$157,086	\$30,339	\$121,358
<b>Toad relocation</b>	Per Project	No Cost Estimate	na	na				
<b>Habitat Avoidance</b>	On-going	No Cost Estimate	na	na				
<b>On-going Consultation with</b>								
Formal	1.4 /year	\$37,500 /consultation	20%	80%	\$147,268	\$589,072	\$113,773	\$455,092
Informal	1.4 /year	\$7,300	20%	80%	\$28,668	\$114,673	\$22,148	\$88,591
<b>Total</b>					\$361,858	\$1,447,433	\$279,557	\$1,118,226

(1) Based on discussions with the Service and analysis of BOs. (No information is available on the proportion of the total AT essential habitat that is excluded versus included).

(2) Historical and future costs are discounted at 7 percent.

(3) Includes exotic plan/predator removal, revegetation and irrigation, debris removal, and other remediation.

## FALLBROOK NAVAL WEAPONS STATION

The Naval Weapons Station Seal Beach, Detachment Fallbrook (Fallbrook) is a facility operated by the U.S. Navy and is charged primarily with storing and replenishing military ordnance; no training activities occur on site. Approximately 313 acres of CH have been proposed for Fallbrook as part of CH Unit 12, which overlaps the eastern portion of Camp Pendleton; no areas within Fallbrook have been proposed for exclusion.

- 1820 EPS was unable to obtain information from Fallbrook on the type and amount of AT conservation-related activities that have taken place or are likely to take place in the future. The Service was unable to provide any complete formal consultations that discuss the AT and the type of activities and projects likely to affect the species or its habitat. Fallbrook is in the process of completing an updated Integrated Natural Resources Management Plan (INRMP) but it was not available for review at the time of Report. Consequently, no historical or future costs for AT conservation are estimated for Fallbrook.

## FORT HUNTER LIGGETT

- 1830 The Service has proposed to exclude Fort Hunter Liggett (EH Unit 1), a multi-purpose Army facility used for training, housing, recreation, housing and a variety of public events. The Army is currently developing an INRMP and associated Endangered Species Management Plan for the AT for the facility although this document was not available for review at the time of this report.

- 1840 The Service completed a programmatic consultation and formal BO covering four species, including the AT, in August 1997. The primary AT-related conservation activities identified in this BO focused on fencing for cattle grazing, demarcation of sensitive habitat, and AT exclusion from construction areas. According to a biologist at the base grazing activities near AT habitat has ceased, in part due habitat concerns. However, no information was available on the amount of land currently unavailable for grazing or the cost of fencing, if any. The only other AT-related consultation at Fort Hunter Liggett focused on RPMs to be conducted prior and subsequent to a controlled burn.

Based on the information currently available, EPS estimates the costs of two previous consultations at approximately \$112,000 in present value terms. Assuming a similar rate of consultations in the future, costs through 2025 are expected to be \$90,000 in present value terms.

## IMPACT TO FOREST SERVICE ACTIVITIES

1850 The USDA Forest Service (USFS) conducts a variety of activities that occur within the proposed AT habitat. EPS analysis of mining and grazing, two significant activities occurring on USFS land, are addressed in **Chapter V**. In addition, USFS road construction/maintenance, forest management (e.g., prescribed burning), and recreation activities may affect AT. AT-related costs associated with these activities are borne by USFS.

1860 Discussions with the USFS suggest that the AT-related costs associated with road and trail construction, forest management, and recreation are largely related to habitat surveying. Information provided by the LPNF indicates that project modifications above surveying and biological monitoring are minimal and significant project design changes are rare. According to the LPNF, only one low water crossing road project has required modification for the AT. That design change did not create additional expense for the project.<sup>67</sup>

1870 Discussions with an LPNF Wildlife Biologist indicate that habitat and species survey costs are significant. The Cleveland National Forest, LPNF, San Bernardino National Forest and Angeles National Forest “province-wide” programmatic BO requests substantial habitat surveying and inventorying. According to LPNF, roughly \$200,000 is spent annually on habitat surveying in order to comply with this programmatic consultation.<sup>68</sup> Given that the programmatic covers 64 species, approximately \$3,125 is attributable to the AT. EPS assumes similar costs are borne by all four forests covered by the programmatic, a total of \$12,500 annually. All of these costs are attributed to CH.

## USFS ROAD AND LOW WATER CROSSING PROJECTS

1880 The present value cost of historical USFS road and low water crossing consultations are provided in **Table 29**. Road projects conducted by the USFS necessitate additional surveying and bio-monitoring for the AT beyond what is required by the province-wide programmatic. According to USFS, the average road project demands two to three days of GS-5 level employee time (approximately \$12 per hour) for pre-project surveys and one day of GS-10 level employee time (approximately \$20 per hour) for pre-work surveying and roughly half the project duration for on-site monitoring. The average low water crossing project takes one to two weeks to complete.<sup>69</sup> In total, a low water crossing projects requires approximately \$1,500 in surveying and bio-monitoring for the AT.

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<sup>67</sup> Personal communication with Bob Jarvis, Engineer, Los Padres National Forest, March 30, 2004.

<sup>68</sup> Personal communication with Nathan Freil, Wildlife Biologist, Los Padres National Forest, March 29, 2004.

<sup>69</sup> Ibid.

**Table 29**  
**Historical USFS Road and Low Water Crossing Projects**  
**Economic Analysis of Critical Habitat Designation for the Arroyo Toad**

CH/EH Unit	Project Name	Year	Affected Stream	Cost (1)
5	Re-route of Snowy Trail, Smith Fork Parcel, Mount Pinos Ranger District, Los Padres National Forest	1995	Piru Creek	\$5,515
5	Biological Opinion for the Relocation of a Special Use Road near Blue Point Campground, Los Padres National Forest	1995	Piru Creek	\$5,515
5	Biological Opinion on the Hardluck Campground Low Water Crossing Replacement, Mt. Pinos Ranger District, Los Padres National Forest	2002	Piru Creek	\$3,435
6	Biological and Conference Opinion for Soledad Canyon Road Maintenance, Angeles National Forest	1998	Santa Clara River	\$4,502
15	Biological Opinion Concerning the Indian Flats Road Low-Water Crossing in the San Luis Rey River, on the Palomar District of the Cleveland National Forest	2002	San Luis Rey River	\$3,435
19	Biological Opinion on the Pine Creek Road Repair Project, Cleveland National Forest	1996	Pine Creek	\$5,155
21	Shortcut Saddle to Alder Saddle off-Highway Vehicle Route and Little Rock Recreation Area, Angeles National Forest	1997	Little Rock Creek	\$4,817
<b>Total</b>				<b>\$32,374</b>

(1) Historical costs are converted to a present value based on a 7% discount rate

1890 Approximately seven historical BOs (excluding the programmatic BOs) address USFS roads and low water crossings within the proposed AT CHD. Because some BOs cover two crossings and road projects are likely to be larger in scale than low water crossings, EPS assumes an AT-related cost of \$3,000 per project. Additional road projects may be conducted under programmatic consultation but the quantity of these is difficult to estimate.

## ADDITIONAL USFS ACTIVITIES

USFS forest management activities have been addressed within programmatic consultations. According to the LPNF, forest management activities have generally avoided riparian areas and AT-related costs.<sup>70</sup> In the future, it will be necessary to address forest management in riparian areas and avoidance and minimization measures are likely.

1900 Recreational impacts include seasonal and permanent area closures. In the LPNF, Off-Highway Vehicle (OHV) roads are closed to protect the AT. According to the LPNF, numerous substitute roads exist and OHV usage is unlikely to have decreased as a result of the closures.<sup>71</sup> In Angeles National Forest, the Little Rock Recreation Area has been closed to all uses as a result of the AT. In 1995, Angeles National Forest undertook seasonal closure of approximately 300 acres and increased law enforcement to protect AT. Due to AT deaths, the entire 3,000 acre Little Rock Area was closed in 1998. Law enforcement and fence maintenance in this area cost approximately \$80,000 per year. According to Angeles National Forest, substitute sites for OHV usage and “water play” within the forest have offset the closure of the Little Rock Recreation Area. Thus, no efficiency effects associated with this closure are estimated.

## IMPACT TO BLM LAND AND ACTIVITIES

1910 EPS has identified two formal BOs from the consultation history that address activities on Bureau of Land Management (BLM) land. The BOs both addressed communications (i.e., cable/fiber optic) projects and are addressed in the Utilities and Other Infrastructure section above.

## IMPACT TO TRIBAL ACTIVITIES

Approximately 3,000 acres of the AT CHD covers land owned by Indian Tribes. Review of the consultation history suggests that Tribal activities include development and infrastructure projects. EPS considers costs borne by the Tribes as a result of AT protection in the context of these activities.

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<sup>70</sup> Ibid.

<sup>71</sup> Ibid.

## **IMPACT TO FOREST FIRE MANAGEMENT**

- 1920 The Service has issued four formal BOs for prescribed burning. These BOs reflect consultations with the Federal Emergency Management Agency, the San Diego County Fire Chief's Association, Fort Hunter Liggett and the Camp Pendleton Marine Base. The BOs generally address multiple species and request pre- and post-burn surveys and monitoring, minimal precautionary measures, and timing constraints. No compensation has been requested to offset AT impacts. EPS does not quantify AT-related cost impacts associated with this activity. The administrative burden associated with these consultations is addressed in **Appendix F**.

## **IMPACT TO EXOTIC SPECIES REMOVAL**

- 1930 Three formal BOs have been issued for exotic plant and animal removal. These BOs reflect consultations with the US Army Corps of Engineers and Los Padres National Forest. Species removal projects deal with arundo, giant reed, salt cedar, tamarisk, and exotic fish and amphibian species. Avoidance and minimization measures include surveys and monitoring, minimal precautionary measures, prohibition of herbicides on native vegetation, and timing constraints. EPS does not quantify AT-related project modification cost impacts associated with this activity.

## **IMPACT TO CITIZENSHIP AND IMMIGRATION SERVICES**

- 1940 One formal BO addresses U.S. Border Patrol activities. The consultation addressed general road usage and maintenance along the Cottonwood Creek and Tijuana River in San Diego County. Avoidance and minimization measures include limiting road usage (e.g., avoiding driving at night or in the rain) and maintenance in AT-sensitive areas. EPS does not quantify AT-related project modification cost impacts associated with this activity.

## **IMPACT TO RESEARCH**

Two BOs have been issued for research activities. These BOs address collection of the AT for research and the sampling of steelhead trout. Avoidance and minimization measures only include minimal precautionary measures. EPS does not quantify AT-related project modification cost impacts associated with this activity.

## VI. ADDITIONAL ECONOMIC IMPACTS

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1950 The previous chapters provide estimates of impacts from AT conservation activities on a variety of private and public projects. In this chapter, other types of economic impacts are evaluated, including impacts to certain projects from the California Environmental Quality Act (CEQA), impacts related to project delays, and impacts to project applicants and landowners that are generated by regulatory uncertainty and stigma effects. In addition, the historical costs associated with preparing HCPs that protect the AT and its habitat are estimated.

### CEQA-RELATED IMPACTS

1960 This section discusses whether CHD provides new information that triggers additional administrative costs under CEQA. It explains how CEQA functions to protect species and habitat and to what degree any CEQA-imposed costs may be linked to these activities.<sup>72</sup>

CEQA is a California State statute that requires State and local agencies (known here as “lead agencies”) to identify the significant environmental impacts of their actions and to avoid or mitigate those impacts, if feasible. Projects carried out by Federal agencies are not subject to CEQA provisions. CEQA regulations require a lead agency to initially presume that a project will result in a potentially significant adverse environmental impact and to prepare an Environmental Impact Report (EIR) if the project may produce certain types of impacts,<sup>73</sup> including when

1970 *[t]he project has the potential to substantially degrade the quality of the environment, substantially reduce the habitat of a fish or wildlife species, cause a fish or wildlife population to drop below self-sustaining levels, threaten to eliminate a plant or animal community, reduce the number or restrict the range of an endangered, rare, or threatened species, or eliminate important examples of the major periods of California history or prehistory.*<sup>74</sup>

State law instructs the lead agency (typically a county or city community development or planning department in the case of land development projects) to examine impacts from a very broad perspective, taking into account the value of animal and plant

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<sup>72</sup> Please note that to the extent that CEQA provides co-extensive protections to the AT and its habitat, these project modification costs are accounted for in the previous chapters. This section focuses on whether critical habitat triggers additional administrative burden under CEQA for landowners or project proponents.

<sup>73</sup> Categories of “environmental impact” evaluated in the context of CEQA review and/or EIR preparation typically include geological, air quality, water quality, noise, light/glare, land use planning, population, housing, transportation/circulation, public service, utility system, energy, human health, aesthetic, recreational, and cultural resource impacts.

<sup>74</sup> California Natural Resources Code §15065(a).



1980     habitats to be modified by the project. The lead agency must determine which, if any, project impacts are potentially significant and, for any such impacts identified, whether feasible mitigation measures or feasible alternatives will reduce the impacts to a level less than significant. It is within the power of a lead agency to decide that negative impacts are acceptable in light of economic, social, or other benefits generated by the project.

1990     Projects without a mandatory finding of significance and in which the applicant finds no significant impact according to CEQA regulations may be approved by a lead agency in what is known as a “negative declaration.” Alternative project scenarios are not examined in a negative declaration, and the expenditures are typically much lower than what would be required to complete an EIR.

Alternatively, an applicant may request that a lead agency issue a permit or some other discretionary approval for a project that is redesigned to either avoid or mitigate all impacts to the environment. Typically, the project is accompanied by mitigation measures in the form of a “mitigated negative declaration.” Similar to a negative declaration, the expenditures required for the approval of a project with a mitigated negative declaration are on average much lower than costs associated with an EIR.

2000     Finally, minor projects that fit one of eleven classifications as defined by the CEQA statutes may be found to have no significant effect on the environment. Some of these classifications are listed here.

- Certain alterations of existing facilities
- Replacement or reconstruction of existing structures
- Smaller development projects such as restaurants smaller than 2500 square feet
- Certain projects involving landscaping or temporary trenching
- Lot line adjustments
- Experimental management or research
- 2010     • Habitat restoration
- Certain safety inspections and mortgage lending
- Signs and small parking lots

Many of these types of minor projects are eligible for a categorical exemption from the provisions of CEQA altogether, and compliance costs are usually limited to completion of the paperwork required by the lead agency.

## EFFECTS ON LARGE PROJECTS THROUGH CEQA

2020 Real estate development projects that are responsible for nearly all housing construction and a large share of industrial and commercial construction in California counties (i.e., “large projects”) are required under CEQA to submit an EIR for public review and consider project alternatives. A lower level of CEQA review, perhaps taking the route of a negative declaration, for example, is highly unlikely for such large-scale development projects. Preparation of an EIR for any such development project will include formal consideration of all potential environmental impacts, including biological and/or habitat-related impacts, irrespective of the presence of designated CH.

2030 This analysis evaluates whether CHD results in additional requirements and/or costs during the preparation of an EIR. In the process of doing this analysis, a series of consultants who specialize in EIRs were asked whether the presence of CH on the project site added to the cost of preparing the EIR and moving the EIR through public hearings as part of the project’s entitlement process. The consensus view in the consultant community is that CHD adds no measurable CEQA-related cost for the project applicant above that already required to comply with the CEQA statutes.<sup>75</sup>

First, where listed species are present on the project site, the EIR’s biological component will be required to discuss and evaluate habitat impacts, as well as present project alternatives. This requirement is unchanged after Federal designation of CH.

2040 Second, where species are not present on the project site, CEQA directs the EIR to inventory the important natural resources are on the project site and characterize project impacts to important habitat types. CEQA makes no reference to CH, and methods used by EIR biologists are unlikely to change if CH is designated. In fact, according to State officials, State agency oversight of the quality and completeness of a project EIR concentrates wholly on the biological values of habitat in proximity to the project and on potential project impacts to that habitat, and not on the property’s status as federally designated CH.

2050 In conclusion, this analysis finds that CHD for the AT is unlikely to increase EIR costs above those required under CEQA for any large projects in the eight counties proposed for CHD.

## INDIRECT EFFECTS ON SMALLER PROJECTS THROUGH CEQA

The question of whether CHD can change the public review process for a smaller project that requires a discretionary action by lead agencies in California does not appear to have been answered either by the implementation of CEQA or by litigation over the

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<sup>75</sup>Personal communication with senior staff from RBF Consulting (San Jose, California), EDAW (Sacramento, California) and HT Harvey & Associates (Watsonville, California), February 24–28, 2003.

allowable extent of CEQA's exemption language. It is likely that the next 10–20 years will establish a regulatory record or the judicial review required for an adequate assessment of CHD's actual effects.

2060 In the absence of empirical evidence, this analysis assumes that State law will disqualify certain types of projects from claiming a categorical exemption if the project is located in designated CH or EH, and that these projects would be required to prepare an EIR. Second, this analysis assumes that all projects that would have submitted either a mitigated negative declaration or a negative declaration under CEQA prior to CHD will also need to complete an EIR due to the potential impact to essential AT habitat.

2070 This analysis estimates the number of future projects that would have sought either a categorical exemption or a negative declaration in the absence of proposed CH/EH by consulting the historical rate of CEQA document submittal in each county. A summary of the annual number of CEQA documents submitted in each county between 1996 (the year of AT listing) and 2004 is presented in **Table 30**. These totals were converted to an historical annual rate, which was used to project future document submittals in proposed CH/EH based on population growth and development forecasts. The resulting projections are shown in **Tables 31** and **32** for CH and EH, respectively.

2080 The economic impact of the proposed rulemaking is estimated as the difference between the cost to perform an EIR and the cost either to (a) perform a negative declaration or (b) apply for and receive a categorical exemption. Based on interviews conducted with biological consultants who frequently develop CEQA documents, this analysis assumes the costs to apply for and receive a Categorical Exemption, prepare a negative declaration, and prepare an EIR are approximately \$500, \$7,500, and \$50,000, respectively, for small projects.<sup>76</sup> As shown in **Tables 31** and **32**, the present value of indirect CEQA costs following CHD are estimated to be approximately \$7.3 million and \$4.9 million for CH and EH, respectively.

## REGULATORY DELAY IMPACTS

2090 Land use projects in California are generally required to undertake a variety of planning and entitlement-related activities prior to actual approval. While AT conservation-related regulatory requirements are likely to increase the administrative costs of most land use projects, they will not necessarily delay their implementation. Given a sufficient knowledge of the regulatory environment, the various administrative activities associated with the Act can generally be coordinated with other regulatory processes (such as tentative map approvals or action on project EIRs) and do not necessarily increase the time to obtain approvals.

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<sup>76</sup>Personal communication with senior staff from RBF Consulting (San Jose, California), EDAW (Sacramento, California) and HT Harvey & Associates (Watsonville, California), February 24–28, 2003.

**Table 30**  
**CEQA Document Submittals by County**  
**Economic Analysis of Critical Habitat Designation for the Arroyo Toad**

County	CEQA Document Type (1996 - 2004)			Total
	Notice of Exemption	Negative Declaration	EIR	
San Diego	1,154	1,679	325	<b>3,158</b>
Orange	941	642	217	<b>1,800</b>
Los Angeles	1,826	1,740	565	<b>4,131</b>
Ventura	410	262	11	<b>683</b>
Riverside	680	702	171	<b>1,553</b>
San Bernardino	674	750	134	<b>1,558</b>
Santa Barbara	480	374	108	<b>962</b>
Monterey	504	571	94	<b>1,169</b>
<b>Total</b>	<b>6,669</b>	<b>6,720</b>	<b>1,625</b>	<b>15,014</b>

Source: CEQAnet database (accessed online at <http://www.ceqanet.ca.gov/queryform.asp?>)

**Table 31**  
**CEQA Costs for Estimated Projects in CH**  
**Economic Analysis of Critical Habitat Designation for the Arroyo Toad**

CH Unit	County	Annual CEQA Documents in CH (1)		Present Value of CEQA Cost (2)		
		Notice of Exemption	Negative Declaration	Notice of Exemption	Negative Declaration	Total
1	Monterey	--	--	--	--	--
2	Santa Barbara	0	0	\$27,704	\$18,533	\$46,237
3	Santa Barbara	0	0	\$232	\$155	\$388
4	Ventura	0	0	\$124	\$68	\$193
5	Los Angeles	0	0	\$7,642	\$6,252	\$13,893
	<u>Ventura</u>	<u>0</u>	<u>0</u>	<u>\$126</u>	<u>\$69</u>	<u>\$195</u>
	Unit Total	0	0	\$7,767	\$6,321	\$14,088
6	Los Angeles	1	0	\$272,680	\$223,093	\$495,772
7	Los Angeles	1	1	\$438,673	\$358,899	\$797,572
8	Orange	0	0	\$14,818	\$8,680	\$23,498
9	Riverside	0	0	\$4	\$4	\$8
10	Orange	1	1	\$432,099	\$253,112	\$685,210
	<u>Riverside</u>	<u>0</u>	<u>0</u>	<u>\$0</u>	<u>\$0</u>	<u>\$0</u>
	Unit Total	1	1	\$432,099	\$253,112	\$685,210
11	Orange	0	0	\$123,522	\$72,356	\$195,877
	<u>San Diego</u>	<u>0</u>	<u>0</u>	<u>\$0</u>	<u>\$0</u>	<u>\$0</u>
	Unit Total	0	0	\$123,522	\$72,356	\$195,877
12	San Diego	0	0	\$100,446	\$125,476	\$225,921
13	Riverside	0	0	\$1,817	\$1,611	\$3,428
	<u>San Diego</u>	<u>0</u>	<u>0</u>	<u>\$83,255</u>	<u>\$104,002</u>	<u>\$187,257</u>
	Unit Total	0	0	\$85,073	\$105,613	\$190,686
14	San Diego	1	1	\$336,543	\$420,406	\$756,949
15	San Diego	0	1	\$201,391	\$251,576	\$452,967
16	San Diego	1	1	\$424,647	\$530,465	\$955,112
17	San Diego	0	0	\$102,554	\$128,110	\$230,664
18	San Diego	0	1	\$238,613	\$298,072	\$536,685
19	San Diego	1	1	\$510,200	\$637,337	\$1,147,537
20	San Bernardino	0	0	\$28,702	\$27,421	\$56,123
21	Los Angeles	0	0	\$0	\$0	\$0
22	San Bernardino	0	1	\$253,996	\$242,668	\$496,663
23	Riverside	0	0	\$10,431	\$9,246	\$19,677
<b>Total</b>		<b>7</b>	<b>8</b>	<b>\$3,610,218</b>	<b>\$3,717,610</b>	<b>\$7,327,828</b>

(1) Based on historical rate of CEQA document submittal (by County). Projections were estimated based on historical/projected population growth, and allocated among habitat units based on projected growth acres in CH vs. the County as a whole.

(2) Assumes CHD causes projects that might otherwise have received a Categorical Exemption or produced a Negative Declaration will be required to prepare an EIR. The assumed cost to produce these document types are \$500, \$7,500, and \$50,000, respectively.

**Table 32**  
**CEQA Costs for Estimated Projects in EH**  
**Economic Analysis of Critical Habitat Designation for the Arroyo Toad**

EH Unit	County	Annual CEQA Documents in EH (1)		Present Value of CEQA Cost (2)		
		Notice of Exemption	Negative Declaration	Notice of Exemption	Negative Declaration	Total
1	Monterey	0	0	\$5	\$4	\$9
6	Los Angeles	2	2	\$1,128,431	\$923,225	\$2,051,656
8	Orange	0	0	\$81,488	\$47,733	\$129,221
9	Riverside	0	0	\$142,961	\$126,715	\$269,676
10	Orange	0	0	\$0	\$0	\$0
11	Orange	0	0	\$120	\$70	\$190
	San Diego	0	0	\$0	\$0	\$0
	Unit Total	0	0	\$120	\$70	\$190
12	San Diego	0	0	\$72	\$90	\$162
13	Riverside	1	1	\$288,708	\$255,900	\$544,608
14	San Diego	0	0	\$100	\$125	\$226
16	San Diego	0	0	\$167,460	\$209,189	\$376,649
17	San Diego	0	1	\$254,193	\$317,535	\$571,728
18	San Diego	0	0	\$73,263	\$91,520	\$164,783
19	San Diego	0	0	\$138,188	\$172,623	\$310,810
22	San Bernardino	0	1	\$241,145	\$230,390	\$471,535
<b>Total</b>		<b>5</b>	<b>5</b>	<b>\$2,516,133</b>	<b>\$2,375,120</b>	<b>\$4,891,254</b>

(1) Based on historical rate of CEQA document submittal (by County). Projections were estimated based on historical/projected population growth, and allocated among habitat units based on projected growth acres in CH vs. the County as a whole.

(2) Assumes CHD causes projects that might otherwise have received a Categorical Exemption or produced a Negative Declaration will be required to prepare an EIR. For "small projects," the assumed cost to produce these document types are \$500, \$7,500, and \$50,000, respectively.

2100 AT conservation activities can, however, cause time delays to some private land development projects due to requirements not to conduct certain construction activities during specific periods of the year (i.e., during the AT breeding season). In addition, projects pursued by applicants unfamiliar with the requirements of the Act may be delayed until compliance requirements become better understood. Consequently, this analysis estimates the potential impact of project delays that may occur in the short-term, or one to two years after finalization of the AT CHD. This analysis focuses on land development activities, the area most likely to experience delays.

The following assumptions were made to estimate the economic cost of time delay associated with the CHD breeding season requirements and other factors:<sup>77</sup>

- 2110 • Projects expected to begin more than 12 months after CHD are not expected to face any additional delay, as land development activities can be planned around the breeding season.
- AT protection will delay all private land development projects slated to begin development in the 12 months following designation. However, projects expected to begin more than 12 months after CHD will face no additional delays.
- The average delay to projects slated to occur in the next 12 months is 6 months (the maximum breeding season duration).
- Private land development will occur at a constant rate through 2025.
- 2120 • The land value loss associated with this delay can be estimated by applying the appropriate discount rate – a measure of the time value of money. As discussed in **Chapter III**, the private land developer annual discount rate is about 7 percent. This discount rate is halved to calculate the time loss associated with a six-month delay.

2130 **Tables 33 and 34** summarize the economic cost of time delay and other development impacts by unit, with a more detailed summary of delay costs provide in **Appendix E**. About 4,700 acres and 2,400 acres of private land development is expected to occur in CH/EH through 2025 (see **Appendix E**). Of this, one-twenty first (1/21), or 222 acres and 115 acres (CH and EH, respectively), are expected to be developed in the first 12 months after designation and are expected to be delayed by an average of 6 months. Assuming 3.4 percent real appreciation in land value and a 7 percent discount rate, this time delay results in a total land value loss of approximately \$838,000 and \$485,000 in CH and EH, respectively.

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<sup>77</sup> The AT breeding season typically occupies a 3-month period from March 15 to June 15 (though in certain desert areas the breeding season can last as long as six months, through mid-August). Given advance warning, that most private development projects can time their habitat-disturbing land development activities to avoid the breeding period.

**Table 33**  
**Summary of Private Development Impacts of Proposed CH**  
**Economic Analysis of Critical Habitat Designation for the Arroyo Toad**

CH Unit	Land Value Loss	Other Project Modifications	Administrative Costs	Additional CEQA Costs	Delay	Total Cost
1	--	--	--	--	--	--
2	\$146,619	\$349,199	\$45,975	\$46,237	\$175	<b>\$588,206</b>
3	\$1,229	\$2,928	\$386	\$388	\$1	<b>\$4,932</b>
4	\$5,741	\$1,303	\$172	\$193	\$7	<b>\$7,416</b>
5	\$359,193	\$110,044	\$14,488	\$14,088	\$415	<b>\$498,229</b>
6	\$12,598,254	\$3,879,780	\$510,803	\$495,772	\$14,499	<b>\$17,499,109</b>
7	\$20,353,767	\$6,241,580	\$821,753	\$797,572	\$23,641	<b>\$28,238,312</b>
8	\$1,668,197	\$178,270	\$23,471	\$23,498	\$2,053	<b>\$1,895,489</b>
9	\$844	\$58	\$8	\$8	\$1	<b>\$918</b>
10	\$48,358,170	\$5,198,350	\$684,403	\$685,210	\$59,898	<b>\$54,986,031</b>
11	\$14,020,363	\$1,486,025	\$195,647	\$195,877	\$17,069	<b>\$15,914,980</b>
12	\$38,003,844	\$1,728,770	\$227,606	\$225,921	\$34,604	<b>\$40,220,746</b>
13	\$31,884,381	\$1,459,013	\$192,090	\$190,686	\$29,149	<b>\$33,755,318</b>
14	\$127,845,601	\$5,792,237	\$762,593	\$756,949	\$116,278	<b>\$135,273,657</b>
15	\$76,186,729	\$3,466,140	\$456,344	\$452,967	\$69,392	<b>\$80,631,571</b>
16	\$160,572,555	\$7,308,599	\$962,234	\$955,112	\$146,205	<b>\$169,944,705</b>
17	\$38,729,526	\$1,765,060	\$232,384	\$230,664	\$35,244	<b>\$40,992,878</b>
18	\$90,231,818	\$4,106,759	\$540,687	\$536,685	\$82,136	<b>\$95,498,085</b>
19	\$193,246,423	\$8,781,053	\$1,156,094	\$1,147,537	\$175,964	<b>\$204,507,070</b>
20	\$2,404,742	\$417,266	\$54,936	\$56,123	\$3,152	<b>\$2,936,219</b>
21	\$0	\$0	\$0	\$0	\$0	<b>\$0</b>
22	\$21,708,341	\$3,692,613	\$486,161	\$496,663	\$25,136	<b>\$26,408,914</b>
23	\$2,132,360	\$149,828	\$19,726	\$19,677	\$2,560	<b>\$2,324,151</b>
<b>Subtotal, Future Costs</b>	<b>\$880,458,696</b>	<b>\$56,114,873</b>	<b>\$7,387,960</b>	<b>\$7,327,828</b>	<b>\$837,580</b>	<b>\$952,126,937</b>
<b>Historical Costs</b>	<b>\$15,009,774</b>	<b>\$1,149,261</b>	<b>\$295,830</b>	<b>--</b>	<b>--</b>	<b>\$16,454,864</b>
<b>Total</b>	<b>\$895,468,469</b>	<b>\$57,264,134</b>	<b>\$7,683,790</b>	<b>\$7,327,828</b>	<b>\$837,580</b>	<b>\$968,581,801</b>



**Table 34**  
**Summary of Private Development Impacts of Proposed EH**  
**Economic Analysis of Critical Habitat Designation for the Arroyo Toad**

<b>EH Unit</b>	<b>Land Value Loss</b>	<b>Other Project Modifications</b>	<b>Administrative Costs</b>	<b>Additional CEQA Costs</b>	<b>Delay</b>	<b>Total Cost</b>
1	\$111	66	9	\$9	\$0	\$195
2	--	0	0	--	--	\$0
3	--	0	0	--	--	\$0
4	--	0	0	--	--	\$0
5	--	0	0	--	--	\$0
6	\$51,216,825	16,055,702	2,113,858	\$2,051,656	\$60,422	\$71,498,463
7	--	0	0	--	--	\$0
8	\$9,173,091	980,333	129,068	\$129,221	\$10,822	\$10,422,535
9	\$29,330,500	2,053,428	270,350	\$269,676	\$34,602	\$31,958,557
10	\$0	0	0	\$0	\$0	\$0
11	\$13,629	1,445	190	\$190	\$16	\$15,470
12	\$27,244	1,240	163	\$162	\$32	\$28,841
13	\$61,613,190	4,146,875	545,968	\$544,608	\$72,687	\$66,923,329
14	\$38,002	1,726	227	\$226	\$45	\$40,227
15	--	0	0	--	--	\$0
16	\$63,792,620	2,882,150	379,458	\$376,649	\$75,258	\$67,506,136
17	\$95,170,891	4,374,910	575,991	\$571,728	\$112,276	\$100,805,796
18	\$27,700,672	1,260,937	166,012	\$164,783	\$32,679	\$29,325,084
19	\$52,260,535	2,378,347	313,128	\$310,810	\$61,654	\$55,324,474
20	--	0	0	--	--	\$0
21	--	0	0	--	--	\$0
22	\$20,763,837	3,505,786	461,564	\$471,535	\$24,496	\$25,227,217
23	--	0	0	--	--	\$0
<b>Subtotal, Future Costs</b>	<b>\$411,101,147</b>	<b>\$37,642,945</b>	<b>\$4,955,987</b>	<b>\$4,891,254</b>	<b>\$484,990</b>	<b>\$459,076,323</b>
<b>Historical Costs (1)</b>	<b>--</b>	<b>--</b>	<b>--</b>	<b>--</b>	<b>--</b>	<b>\$0</b>
<b>Total</b>	<b>\$411,101,147</b>	<b>\$37,642,945</b>	<b>\$4,955,987</b>	<b>\$4,891,254</b>	<b>\$484,990</b>	<b>\$459,076,323</b>

## UNCERTAINTY EFFECTS

2140 Developers face uncertainty over the project modifications that will ultimately be required due to AT conservation activities. For example, the outcome of section 7 consultations can be uncertain: the Service conducts each consultation on a case-by-case basis and issues BOs and recommends project modifications based on species-specific and site-specific considerations. While some differences in recommended project modifications are clearly linked to habitat quality and other determinable factors, an element of uncertainty remains.

2150 The costs estimated in **Chapter II** considered the economic costs associated with an average expected habitat compensation ratio and suite of project modifications. While these estimates represent the average economic costs, the outcome for individual landowners/ developers will fluctuate above and below these expected levels. For example, a review of historical consultation suggests that the average land set-aside for AT habitat in a real estate development project ranges from a low of 0.29-to-1 to a high of 2.44-to-1, with an expected value of 1.25-to-1 (1.25 acres of set-aside for every 1 acre developed, as calculated in **Table 4**).

2160 The economic effects of uncertainty depend on the degree to which developers – and more specifically, their financiers – are risk-averse. At any given time, a developer may be choosing between a portfolio of potential development opportunities, some within and others outside of the proposed CHD. It is possible that the regulatory uncertainty associated with the section 7 and section 10 may temporarily render projects within CHD less desirable than alternative development opportunities. Consequently, the developer may delay construction within CHD until market support strengthens and/or negotiate a reduced purchase price with the property owner to compensate for the additional risk.

2170 It is important to note that the increased uncertainty associated with the level of AT conservation activities represents an economic distributional rather than an economic welfare affect. This is because uncertainty per se does not alter regional real estate demand and supply dynamics; the total affect of AT conservation activities remains equal to the expected land set-aside amount (e.g., 1.25-to-1). Some projects will experience a lower set-aside and other projects a higher set-aside but individual market transactions will determine the actual cost incidence. In areas where market demand is strong, developers may be more likely to incorporate the added risk into their project cash-flow, paying property-owners an amount close to the expected residual value of their land. In these cases, property-owners “pass-on” the risk associated with added uncertainty. In weaker markets, property-owners may have to reduce the price of their land and/or delay its sale.

Given the wide range of potential market outcomes, the actual cost incidence due to uncertainty is difficult to predict. While some property owners will undoubtedly suffer, their losses are likely to be offset by gains to developers. The converse may also be true; if

2180 property-owners can successfully pass-on the added risk, some developers may incur higher AT-related conservation costs than reflected in their land purchase price. Overall, the gains are likely to equal the losses. Consequently, this analysis does not estimate economic cost impacts due to uncertainty.

## **STIGMA EFFECTS**

2190 Separate from regulatory uncertainty costs for owners of land in essential habitat are stigma-related effects. Stigma effects are a form of uncertainty that relate less to observed variation in project modifications and more to perceived fluctuations when there is limited information on actual outcomes. Stigma effects last for a limited time period as increasing levels of information erode the perceived fluctuations, replacing them with a more accurate assessment of the actual uncertainty. They also tend to last only as long as the “fastest learners” remain unclear about the actual uncertainty associated with CHD.

In a situation where some market actors are clear about the effects and are able to appropriately discount the land values, while others incorporate a stigma and discount the land further, arbitrage is likely to occur—the “fastest learners” will buy the land from others, gradually increasing the land price until it reaches the value of land associated with actual uncertainty discounting only.

2200 Overall, the stigma effect primarily results in a land value distribution to the “fastest learners” from others. This analysis recognizes that a small fraction of the acreage affected by proposed designation is subject to a short-term stigma effect and that, because of clear regulatory requirements for a listed species such as the AT, the magnitude of the actual stigma costs is small. These stigma costs are the sum of the transaction costs associated with arbitrage and the investment made in understanding the project modification requirements. Consequently, no estimate of the effect is provided.

## **HABITAT CONSERVATION PLAN COSTS**

2210 There are currently four regionally approved HCPs that cover essential AT habitat proposed for exclusion. This section estimates the cost of preparing these HCPs including the San Diego MSCP, the Western Riverside MSHCP, the San Diego Gas & Electric HCP, and the Orange County Central-Coastal HCP, and the proportion of these costs attributable to the AT.

Regional, multi-species HCPs are generally prepared over the course of many months, even years, and require the involvement of private sector consultants, local public agency staff, scientists, Federal agency staff, and local stakeholders (including

2220 landowners and members of the development, agricultural and environmental communities). The collaborative nature of the HCP process often results in delays in this process as well as undulating levels of work effort and cost.

There are no formal records of the cost of developing these HCPs and much of the time and effort put into their development is the unreimbursed time of stakeholders. This analysis focuses on three major cost categories in developing its estimate: the private consultant costs, the local agency costs (including cities, counties, transportation agencies), and Federal Agency costs (including the USFWS, Park Service or other). The cost estimates are, by their nature, approximations.

2230 Background information on the four HCPs associated with AT essential habitat, including planning area and preserve area sizes, the number of cities involved in the process (a proxy for jurisdictional complexity), the number of species considered and the number of federally listed species covered, is provided in **Table 35**. As shown, all of the HCPs cover a significant number of species that are not federally listed under the Act. Based on these considerations, the HCPs are ranked in terms of their complexity.

## ECONOMIC COST CALCULATION

2240 A summary of the estimated cost estimate for the four HCPs relevant to the AT, and the corresponding AT-related cost, is provided in **Table 36**. These cost estimates are based on a review of several consultant proposals to prepare HCPs of moderate complexity and approximations of the time spent by local agency and Federal agency staff in attending meetings and preparing and reviewing information. As shown, the present value of historical costs attributable to the AT is estimated at about \$506,000.

2250 The costs attributable to the AT is derived as a small proportion, or about 3 percent, of the total HCP preparation cost. This is because a proportion of the total costs, or about 50 percent, is allocated to federally listed species (their share of all species is about 20 percent but Federal listed species are considered more important drivers in the HCP process). This cost is then divided equally between all the federally listed species. The total preparations costs are estimated to total \$10.2 million for the four HCPs with the consultant cost being by far the largest component of costs.

**Table 35**  
**Habitat Conservation Plan Background Information**  
**Economic Analysis of Critical Habitat Designation for the Arroyo Toad**

<b>Plan</b>	<b>Year Approved</b>	<b>Planning Area (acres)</b>	<b>Preserve Area (acres)</b>	<b>Number of Cities</b>	<b>Total Species</b>	<b>Listed Species</b>	<b>Complexity</b>
San Diego MSCP	on-going	582,000	171,000	11	85	17	High
Central-Coastal Orange County NCCP/ HCP	1996	208,713	38,738	5	39	8	Moderate
San Diego Gas & Electric NCCP/ HCP	1995	Unknown	240	0	110	18	Low
Proposed Western Riverside MSHCP	on-going	1,300,000	153,000	14	150	30	High

**Table 36**  
**Habitat Conservation Plan Preparation Costs**  
**Economic Analysis of Critical Habitat Designation for the Arroyo Toad**

Plan	Consultant Costs (1)	Local Agency Costs (2)	Federal Agency Costs	Total Costs	Listed Species Cost (4)	Arroyo Toad Costs (5)	
						Actual	Present Value (6)
San Diego MSCP	\$3,000,000	640000	320000	\$3,960,000	\$1,980,000	\$116,471	\$200,118
Central-Coastal Orange County NCCP/ HCP	\$1,500,000	160000	80000	\$1,740,000	\$870,000	\$108,750	\$199,932
San Diego Gas & Electric NCCP/ HCP	\$500,000	40000	20000	\$560,000	\$280,000	\$15,556	\$30,600
Proposed Western Riverside MSHCP	\$3,000,000	640000	320000	\$3,960,000	\$1,980,000	\$66,000	\$75,563
<b>Total</b>	<b>\$8,000,000</b>	<b>\$1,480,000</b>	<b>\$740,000</b>	<b>\$10,220,000</b>	<b>\$5,110,000</b>	<b>\$306,776</b>	<b>\$506,214</b>

(1) Regional, multi species conservation plans of average size and complexity tend to cost about \$1.5 million in consultants costs to prepare (based on a review of consultant proposals for HCP with an added contingency). The San Diego MSCP and Riverside MSHCP are both more complex plans and are assumed to have twice the consultant costs of the average plan. The San Diego Gas and Electric HCP, because it involvement fewer local agencies a more limited range of and covers activities, is assumed to cost one third of the cost of the average plan.

(2) Local agencies are assumed to allocate 1 FTE's over the course of two years to the prepeation of an average regional, multi species HCP. Assuming and equipment cost an average salary, benefits, of \$80,000 per FTE annually, this results in a cost of \$160,000. More complex plans with more jurisdictions are assumed to require 2 FTE's over a course of four years for a total cost of \$640,000. Simpler HCP's are assumed to require 0.5 FTE over the course of a year for a total cost of \$40,000.

(3) It is assumed that 0.5 FTE of a Service Personnel over two years will be required for an average HCP, 1.0 FTE over four years for a complex one, and 0.5 FTE over six months for a simpler one. Assuming a \$80,000 per FTE per annum cost, this results in a Service cost of \$80,000 for an average plan, \$320,000 for a complex plan, and \$40,000 for a simpler plan.

(4) Although federally listed species tend to represent about 20 percent of the species considered, it is assumed that they are given more attention and hence command a higher proportion of the costs, assumed at 50 percent for the purposes of this analysis.

(5) It is assumed that each of the federally listed species generate a similar proportion of the cost share attributable to federally listed species.

(6) Calculates present value of historical costs based on a discount rate of 7% and cost incurred one year prior to approval.



**Economic &  
Planning Systems**

*Real Estate Economics*

*Regional Economics*

*Public Finance*

*Land Use Policy*

## APPENDIX A:

### ECONOMIC IMPACT TO SMALL ENTITIES AND ENERGY

## ECONOMIC IMPACT TO SMALL ENTITIES AND ENERGY

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This Appendix considers the extent to which the analytic results presented in the Economic Analysis reflect future impacts to small entities and energy markets. An analysis of the effect of AT habitat conservation activities on small entities is conducted pursuant to the Regulatory Flexibility Act (RFA), as amended by SBREFA in 1996. The energy analysis is required by Executive Order Number 13211.

### SBREFA ANALYSIS

- 10 Under SBREFA, whenever a Federal agency is required to publish a notice of rulemaking for any proposed or final rule, it must prepare and make available for public comment a regulatory flexibility analysis that describes the effect of the rule on small entities (i.e., small businesses, small organizations, and small government jurisdictions).<sup>78</sup> However, no regulatory flexibility analysis is required if the head of an agency certifies that the rule will not have a significant economic impact on a substantial number of small entities.<sup>79</sup> SBREFA amended the RFA to require Federal agencies to provide a statement of the factual basis for certifying that a rule will not have significant economic impact on a substantial number of small entities. To assist in this process, the following represents a screening level analysis of the potential effects of future AT habitat conservation activities on small entities.

### IDENTIFICATION OF ACTIVITIES THAT MAY INVOLVE SMALL ENTITIES

- 20 The Economic Analysis identifies land use activities affected by AT conservation activities. A wide variety of industry sectors and entities may experience economic costs due to AT conservation activities. Only a subset of the total impact will be borne by small entities. This section considers the extent to which the results of the report (see Tables ES-2 and ES-3) reflect impacts to small entities. **Table A-1** presents a summary of results from the small business impact analysis. A brief overview of the impact of AT conservation on the various sectors considered in the report is provided below.

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<sup>78</sup> 5 U.S.C. 601 et. seq.

<sup>79</sup> Thus, for a regulatory flexibility analysis to be required, impacts must exceed a threshold for “significant impact” and a threshold for a “substantial number of small entities.” See 5 U.S.C. 605 (b).



**Table A-1**  
**Summary of Impacts to Small Businesses and Governments in Proposed Critical Habitat (CH) and Habitat Proposed for Exclusion (EH)**  
**Economic Analysis of Critical Habitat Designation for the Arroyo Toad**

	Monterey	Santa Barabara	Ventura	Riverside	San Diego	Orange	San Bernardino	Los Angeles	Total
<b>Land Development (CH)</b>									
Proportion of Small Businesses Affected (1)	0.00%	0.09%	0.00%	0.01%	1.04%	0.16%	0.48%	0.11%	0.28%
Estimated Annual Impact as a Percentage of Small Business Sales (2)	n/a	2.26%	6.66%	15.34%	29.26%	11.25%	8.84%	5.74%	20.47%
<b>Land Development (EH)</b>									
Proportion of Small Businesses Affected (1)	0.00%	0.00%	0.00%	0.43%	0.33%	0.02%	0.41%	0.18%	0.19%
Estimated Annual Impact as a Percentage of Small Business Sales (2)	3.76%	n/a	n/a	14.09%	29.51%	11.56%	9.08%	5.65%	14.12%
<b>Fruit and Nut Farms (CH)</b>									
Proportion of Small Businesses Affected (1)	0.00%	0.03%	0.03%	0.00%	0.13%	0.00%	0.00%	0.02%	0.04%
Estimated Impact as a Percentage of Small Business Sales (2)	n/a	8.14%	7.35%	5.42%	1.09%	n/a	n/a	0.17%	2.77%
<b>Cattle Ranching (CH)</b>									
Proportion of Small Businesses Affected (1)	0.00%	0.28%	0.57%	0.00%	2.47%	0.00%	0.23%	0.00%	0.45%
Estimated Impact as a Percentage of Small Business Sales (2)	n/a	4.52%	4.39%	n/a	4.83%	n/a	2.42%	n/a	4.49%
<b>Small Governments (CH)</b>									
Proportion of Small Governments Affected (1)	0.00%	0.00%	0.00%	0.00%	0.00%	0.63%	0.00%	0.00%	0.08%
Estimated Impact as a Percentage of Annual Budget (2)	n/a	n/a	n/a	n/a	n/a	0.53%	n/a	n/a	0.53%

(1) Proportion of small businesses in the sector (or small governments) that are affected annually by CHD, presented by county.

(2) Impact as a percent of average annual sales (or general fund budget) per small business in the sector (or small government) by county.

**Real Estate Development.** As discussed in **Chapter II**, AT conservation activities affecting future real estate development projects will be borne by the current landowner, regardless of whether that landowner actually undertakes the development project himself or herself.<sup>80</sup> In many instances, existing landowners may not be businesses. Rather, they may be individuals holding the land as an investment. Technically, individuals who are not businesses are not included in a screening analysis under the RFA. However, in certain cases (e.g., land that is likely to be developed in the next few years), existing landowners may be development companies that are impacted by the conservation activities. To be conservative, this analysis assumes that all of the landowners impacted by future AT conservation activities are developers. This assumption is likely to overstate the actual impacts to small land development firms. Impacts to landowners include lost land value, project modification costs, CEQA costs, delay costs and administrative costs.

**Water Supply Management.** **Chapter III** of the report covers impacts of AT conservation on water supply. These impacts are related to lands proposed for designation. Potential changes to dam and reservoir management practices are expected to result in future water replacement and infrastructure investment costs that are passed on to consumers in the form of higher water prices. Over half of these impacts are borne by households. While water supply impacts are expected to affect variety small businesses, the agriculture sector is considered most likely to experience small business impacts.

**Cattle Grazing.** As discussed in **Chapter IV**, impacts to cattle ranchers include future project modifications such as fencing and water source development. All of the impacts to cattle grazing resulting from AT conservation are associated with lands proposed for designation.

**Mining.** No new mining projects are expected in any of the proposed CH areas. In addition, past mining operations within proposed CHD have exclusively involved large national or international corporations rather than small businesses. As a result, AT conservation efforts are not expected to affect small mining businesses in the future.

**Road and Infrastructure Projects.** CHD is expected to result in additional costs to road and infrastructure projects in areas where CHD provides new information. However, impacts associated with road transportation projects and utilities and infrastructure projects are expected to be borne primarily by the action agencies. Most road projects involve Caltrans, which does not qualify as a small entity. To the extent that impacts on real estate, road transportation, and utilities and infrastructure projects affect small local governments, these impacts are captured in the small government section of this analysis.

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<sup>80</sup> As discussed in Chapter 2, a developer will consider the regulatory restrictions associated with a parcel of land before buying the parcel. Therefore, any costs associated with AT conservation activities will be reflected in the price paid for the parcel. Thus, the cost of AT conservation measures is ultimately borne by current landowners in the form of reduced land values.

- 70    **Local Governments.** Impacts to small local governments may result from involvement in real estate projects, transportation projects, utilities and infrastructure projects, and HCPs. For example, governments may have third party involvement in some real estate consultation efforts. Small local governments may also experience some regional economic impacts related to increased water prices.

**Military Projects.** Military projects do not have a third party involvement (i.e., only the Department of Defense and the Service are expected to be involved). Thus, no small entities are likely to be affected by future AT conservation activities on military land.

## ECONOMIC DATA ON POTENTIALLY AFFECTED SMALL ENTITIES

- 80    The Small Business Administration (SBA) defines small entity in different ways depending upon the type of establishment under consideration. The SBA size standards for the types of private entities potentially affected by AT protections are summarized in the table below based on the relevant North American Industry Classification System (NAICS) code. In addition, the SBREFA defines a “small governmental jurisdiction” as “governments of counties with a population of less than fifty thousand.”<sup>81</sup>

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<sup>81</sup> U.S.C § 601.

SBA SMALL BUSINESS SIZE STANDARDS		
Industry Sector	NAICS Code	SBA Small Business Revenue Threshold
Land Development [1]	237210	Less than \$6 million per year
Agriculture [2]	11133	Less than \$750,000 per year
Cattle Ranching [3]	112111	Less than \$750,000 per year
<p>Notes:</p> <p>[1] NAICS 237210 (Land Subdivision) comprises establishments primarily engaged in servicing land and subdividing real property into lots, for subsequent sale to builders. Servicing of land may include excavation work for the installation of roads and utility lines. The extent of work may vary from project to project. Land subdivision precedes building activity and the subsequent building is often residential, but may also be commercial tracts and industrial parks. These establishments may do all the work themselves or subcontract the work to others. Establishments that perform only the legal subdivision of land are not included in this industry.</p> <p>[2] NAICS 11133 (Non-citrus Fruit and Tree Nut Farming) comprises establishments primarily engaged in one or more of the following: (1) growing non-citrus fruits (e.g., apples, grapes, berries, peaches); (2) growing tree nuts (e.g., pecans, almonds, pistachios); or (3) growing a combination of fruit(s) and tree nut(s) with no one fruit (or family of fruit) or family of tree nuts accounting for one-half of the establishment's agriculture production (value of crops for market).</p> <p>[3] NAICS 112111 (Beef Cattle Ranching and Farming) comprises establishments primarily engaged in raising cattle (including cattle for dairy herd replacements).</p>		

90 Information on the number of firms and total sales for the sectors described above is presented in **Table A-2**, based on data from Dun and Bradstreet and Risk Management Association (RMA).<sup>82</sup> As shown, small firms make up a large percentage of the firms in all three sectors examined. However, the share of total sales attributable to small businesses is much less. Thus, although small businesses constitute a relatively large share of the total firms in each sector, their share of total sales is significantly lower.

## ESTIMATED EFFECTS ON SMALL ENTITIES

The potential impact of AT conservation activities on the small land development businesses is estimated in **Tables A-3** through **A-6**. The projected impact to small fruit and nut farm businesses is presented in **Tables A-7** and **A-8**. Estimated impacts on cattle ranching are provided in **Tables A-9** and **A-10**. Potential impacts on small governmental entities are presented in **Table A-11**.

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<sup>82</sup>This information was gathered in a Dialog search of File 516, Dun and Bradstreet, "Dun's Market Identifiers."

**Table A-2**  
**Number and Type of Potentially Affected Small Businesses by County**  
**Economic Analysis of Critical Habitat Designation for the Arroyo Toad**

Item	Counties with Arroyo Toad Essential Habitat								Total
	Monterey	Santa Barbara	Ventura	Riverside	San Diego	Orange	San Bernardino	Los Angeles	
<b>Total Number of Businesses</b>	21,432	27,416	48,755	79,337	180,590	222,398	80,065	594,621	1,254,614
<b>Land Developers (1)</b>									
<b>Small Businesses</b>									
Average Annual Sales ( <i>in millions</i> )	\$1.8	\$1.6	\$1.6	\$1.6	\$1.6	\$1.6	\$1.5	\$1.6	\$1.6
Number of Small Businesses (2)	91	116	164	395	939	1,192	245	2,607	5,749
Annual Sales Subtotal ( <i>in millions</i> )	\$159.3	\$189.0	\$269.7	\$643.5	\$1,472.6	\$1,960.2	\$376.8	\$4,247.4	\$9,318.5
<b>Large Businesses</b>									
Average Annual Sales ( <i>in millions</i> )	\$43.3	\$40.3	\$40.7	\$40.3	\$38.8	\$40.7	\$38.0	\$40.3	\$40.1
Number of Large Businesses	3	4	6	29	41	63	11	102	259
Annual Sales Subtotal ( <i>in millions</i> )	\$129.9	\$161.2	\$244.1	\$1,168.7	\$1,590.5	\$2,562.6	\$418.4	\$4,110.5	\$10,385.9
<b>Total</b>									
Average Annual Sales ( <i>in millions</i> )	\$3.1	\$2.9	\$3.0	\$4.3	\$3.1	\$3.6	\$3.1	\$3.1	\$3.3
Number of Businesses	94	120	170	424	980	1,255	256	2,709	6,008
Number of Small Businesses as a % of total	97%	97%	96%	93%	96%	95%	96%	96%	--
Total Annual Sales ( <i>in millions</i> )	\$289.3	\$350.2	\$513.7	\$1,812.2	\$3,063.1	\$4,522.7	\$795.2	\$8,357.9	\$19,704.4
Small Business Sales as a % of total	55%	54%	52%	36%	48%	43%	47%	51%	--
<b>Fruit &amp; Nut Farmers (3)</b>									
<b>Small Businesses</b>									
Average Annual Sales ( <i>in millions</i> )	\$0.5	\$0.5	\$0.5	\$0.5	\$0.5	\$0.5	\$0.5	\$0.5	\$0.5
Number of Small Businesses (4)	61	89	179	94	153	52	45	109	782
Annual Sales Subtotal ( <i>in millions</i> )	\$31.4	\$42.6	\$86.5	\$45.0	\$70.5	\$25.1	\$20.3	\$52.2	\$373.6
<b>Large Businesses</b>									
Average Annual Sales ( <i>in millions</i> )	\$3.7	\$3.4	\$3.5	\$3.4	\$3.3	\$3.5	\$3.2	\$3.4	\$3.4
Number of Large Businesses	16	27	39	29	17	13	3	11	155
Annual Sales Subtotal ( <i>in millions</i> )	\$58.9	\$92.4	\$134.8	\$99.3	\$56.0	\$44.9	\$9.7	\$37.7	\$533.7
<b>Total</b>									
Average Annual Sales ( <i>in millions</i> )	\$1.2	\$1.2	\$1.0	\$1.2	\$0.7	\$1.1	\$0.6	\$0.7	\$1.0
Number of Businesses	77	116	218	123	170	65	48	120	937
Number of Small Businesses as a % of total	79%	77%	82%	76%	90%	80%	94%	91%	--
Total Annual Sales ( <i>in millions</i> )	\$90.3	\$135.0	\$221.3	\$144.3	\$126.5	\$70.0	\$30.0	\$89.8	\$907.3
Small Business Sales as a % of total	35%	32%	39%	31%	56%	36%	68%	58%	--
<b>Cattle Ranching (5)</b>									
<b>Small Businesses</b>									
Average Annual Sales ( <i>in millions</i> )	\$0.5	\$0.5	\$0.5	\$0.5	\$0.5	\$0.5	\$0.5	\$0.5	\$0.5
Number of Small Businesses (4)	25	29	24	34	26	12	19	30	199
Annual Sales Subtotal ( <i>in millions</i> )	\$13.2	\$14.3	\$11.9	\$16.7	\$12.3	\$6.0	\$8.8	\$14.7	\$97.9
<b>Large Businesses</b>									
Average Annual Sales ( <i>in millions</i> )	\$17	\$16	\$16	\$16	\$16	\$16	\$15	\$16	\$16.3
Number of Large Businesses	4	5	1	5	1	2	2	2	22
Annual Sales Subtotal ( <i>in millions</i> )	\$69	\$81	\$16	\$81	\$16	\$33	\$30	\$32	\$357.8
<b>Total</b>									
Average Annual Sales ( <i>in millions</i> )	\$2.8	\$2.8	\$1.1	\$2.5	\$1.0	\$2.8	\$1.9	\$1.5	\$2.1
Number of Businesses	29	34	25	39	27	14	21	32	221
Number of Small Businesses as a % of total	86%	85%	96%	87%	96%	86%	90%	94%	--
Total Annual Sales ( <i>in millions</i> )	\$82.6	\$94.9	\$28.2	\$97.4	\$27.8	\$38.5	\$39.3	\$47.0	\$455.7
Small Business Sales as a % of total	16%	15%	42%	17%	44%	15%	22%	31%	--

Source: Dunn & Bradstreet, Jan. 2004.

**Notes:**

- (1) Businesses defined by the North American Industry Classification System (NAICS) code as "Land Subdivision" (NAICS # 237210).
- (2) Defined by the Small Business Administration (SBA) as businesses with an gross annual income of \$6 million or less.
- (3) Businesses defined by the NAICS code as "Fruit and Tree Nut Farming" (NAICS #111335).
- (4) Defined by the Small Business Administration (SBA) as businesses with an gross annual income of \$750,000 or less.
- (5) Businesses defined by the NAICS code as "Beef Cattle Ranching and Farming" (NAICS #112111).

**Table A-3**  
**Impact to Small Business in the Land Development Sector within Proposed Critical Habitat**  
**Economic Analysis of Critical Habitat Designation for the Arroyo Toad**

Impact Category	Formula	Santa Barabara	Ventura	Riverside	San Diego	Orange	San Bernardino	Los Angeles	Total
<b>Total Impact</b>									
Land Value Loss		\$147,848	\$11,548	\$2,521,843	\$756,312,318	\$64,046,648	\$24,113,083	\$33,305,407	880,458,696
Other Project Modifications		\$352,128	\$1,341	\$351,666	\$36,190,055	\$5,295,705	\$3,692,613	\$10,231,366	56,114,873
New Projects Subject to CEQA		\$46,625	\$387	\$23,113	\$4,549,216	\$904,586	\$496,663	\$1,307,238	7,327,828
Project Delay		\$177	\$15	\$3,023	\$691,662	\$79,019	\$25,136	\$38,548	837,580
Administrative Costs		\$46,360	\$177	\$46,300	\$4,764,703	\$697,221	\$486,161	\$1,347,039	7,387,960
<b>Total</b>	<b>a</b>	<b>\$593,138</b>	<b>\$13,468</b>	<b>\$2,945,945</b>	<b>\$802,507,953</b>	<b>\$71,023,180</b>	<b>\$28,813,657</b>	<b>\$46,229,597</b>	<b>952,126,937</b>
<b>Annual Impact (1)</b>	<b>b</b>	<b>\$54,740</b>	<b>\$1,243</b>	<b>\$271,878</b>	<b>\$74,062,658</b>	<b>\$6,554,658</b>	<b>\$2,659,184</b>	<b>\$4,266,483</b>	<b>\$87,870,844</b>
<b>Percent of Sector Revenues Attributable To Small Business (See Table A-2)</b>	<b>c</b>	<b>54%</b>	<b>52%</b>	<b>36%</b>	<b>48%</b>	<b>43%</b>	<b>47%</b>	<b>51%</b>	<b>--</b>
<b>Impacts to Small Business</b>									
Total	d = a * c	\$320,107	\$7,070	\$1,046,144	\$385,816,547	\$30,781,765	\$13,652,138	\$23,493,330	455,117,102

(1) Small business costs are annualized over 21 years based on a 7% discount rate.

**Table A-4**  
**Impact to Small Business in the Land Development Sector within Habitat Proposed for Exclusion**  
**Economic Analysis of Critical Habitat Designation for the Arroyo Toad**

Impact Category	Formula	Monterey	Santa Barabara	Ventura	Riverside	San Diego	Orange	San Bernardino	Los Angeles	Total
<b>Total Impact</b>										
Land Value Loss		\$111	\$0	\$0	\$90,943,691	\$238,989,964	\$9,186,720	\$20,763,837	\$51,216,825	411,101,147
Other Project Modifications		\$66	\$0	\$0	\$3,196,482	\$13,904,523	\$980,387	\$3,505,786	\$16,055,702	37,642,945
New Projects Subject to CEQA		\$9	\$0	\$0	\$814,284	\$1,424,358	\$129,411	\$471,535	\$2,051,656	4,891,254
Project Delay		\$0	\$0	\$0	\$107,289	\$281,945	\$10,838	\$24,496	\$60,422	484,990
Administrative Costs		\$9	\$0	\$0	\$270,350	\$1,981,138	\$129,068	\$461,564	\$2,113,858	4,955,987
<b>Total</b>	<b>a</b>	<b>\$195</b>	<b>\$0</b>	<b>\$0</b>	<b>\$95,332,096</b>	<b>\$256,581,927</b>	<b>\$10,436,424</b>	<b>\$25,227,217</b>	<b>\$71,498,463</b>	<b>459,076,323</b>
<b>Annual Impact (1)</b>	<b>b</b>	<b>\$18</b>	<b>\$0</b>	<b>\$0</b>	<b>\$8,798,104</b>	<b>\$23,679,690</b>	<b>\$963,167</b>	<b>\$2,328,195</b>	<b>\$6,598,522</b>	<b>\$42,367,696</b>
<b>Percent of Sector Revenues Attributable To Small Business (See Table A-2)</b>	<b>c</b>	<b>55%</b>	<b>54%</b>	<b>52%</b>	<b>36%</b>	<b>48%</b>	<b>43%</b>	<b>47%</b>	<b>51%</b>	<b>--</b>
<b>Impacts to Small Business</b>										
Total	d = a * c	\$108	\$0	\$0	\$33,853,703	\$123,355,230	\$4,523,193	\$11,952,855	\$36,334,667	\$210,019,756

(1) Small business costs are annualized over 21 years based on a 7% discount rate.

**Table A-5**  
**Number of Small Land Development Firms Affected and Size of Impact per Firm in Proposed Critical Habitat**  
**Economic Analysis of Critical Habitat Designation for the Arroyo Toad**

Impact Category	Formula (1)	Santa Barabara	Ventura	Riverside	San Diego	Orange	San Bernardino	Los Angeles	Total
<b>Total # of Affected Projects (2)</b>	a	2	0	1	214	43	26	64	349
<b>Avg. Annual # of Affected Projects</b>	b = a / 21 years	0.1	0.0	0.1	10.2	2.0	1.2	3.0	16.6
<b>% of Projects Conducted By Small Businesses (see Table A-2)</b>	c	97%	96%	93%	96%	95%	96%	96%	--
<b>Total # Of Affected Small Business Projects (3)</b>	d = a * c	2	0	1	205	41	24	61	335
<b>Avg. Annual # Of Affected Small Business Projects</b>	e = d / 21 years	0.1	0.0	0.0	9.8	1.9	1.2	2.9	15.9
<b>Number of Small Businesses In Sector (see Table A-2)</b>	f	116	164	395	939	1,192	245	2,607	5,658
<b>Avg. Annual Affected Small Businesses as a % of Sector Total (4)</b>	g = e / f	0.09%	0.00%	0.01%	1.04%	0.16%	0.48%	0.11%	0.28%
<b>Total Impact to Small Businesses In Sector (see Table A-3)</b>	h	\$320,107	\$7,070	\$1,046,144	\$385,816,547	\$30,781,765	\$13,652,138	\$23,493,330	\$455,117,102
<b>Small Business Impact / Project</b>	i = h / d	\$151,061	\$449,193	\$1,024,964	\$1,881,273	\$758,587	\$557,547	\$383,327	\$1,360,223
<b>Annualized Small Business Impact / Project (5)</b>	j	\$36,842	\$109,554	\$249,979	\$458,825	\$185,012	\$135,980	\$93,490	\$331,746
<b>Avg. Annual Sales per Small Business (see Table A-2)</b>	k	\$1,629,218	\$1,644,444	\$1,629,218	\$1,568,313	\$1,644,444	\$1,537,860	\$1,629,218	\$1,620,896
<b>Per Project Impact as a Percent of Total Sales</b>	= j / k	2.26%	6.66%	15.34%	29.26%	11.25%	8.84%	5.74%	20.47%

(1) Actual calculations may include rounding.

(2) Based on annual CEQA documents in County as reported by the Ceqanet database (accessed on-line as [www.ceqanet.ca.gov/querform.asp?](http://www.ceqanet.ca.gov/querform.asp?))

(3) Based on proportion of land development businesses that are small. This is conservative

(4) Assumes each project is conducted by a separate business. In reality the same business might conduct several projects.

(5) Small business costs are annualized over 5 years based on a 7% discount rate to account for the manner and duration that these costs are likely to be absorbed.



**Table A-6**  
**Number of Small Land Development Firms Affected and Size of Impact per Firm in Habitat Proposed for Exclusion**  
**Economic Analysis of Critical Habitat Designation for the Arroyo Toad**

Impact Category	Formula (1)	Monterey	Santa Barabara	Ventura	Riverside	San Diego	Orange	San Bernardino	Los Angeles	Total
<b>Total # of Affected Projects (2)</b>	a	0	0	0	39	68	6	22	100	234
<b>Avg. Annual # of Affected Projects</b>	b = a / 21 years	0.0	0.0	0.0	1.8	3.2	0.3	1.0	4.8	11.2
<b>% of Projects Conducted By Small Businesses (see Table A-2)</b>	c	97%	97%	96%	93%	96%	95%	96%	96%	--
<b>Total # Of Affected Small Business Projects (3)</b>	d = a * c	0	0	0	36	65	6	21	96	224
<b>Avg. Annual # Of Affected Small Business Projects</b>	e = d / 21 years	0.0	0.0	0.0	1.7	3.1	0.3	1.0	4.6	10.7
<b>Number of Small Businesses In Sector (see Table A-2)</b>	f	91	116	164	395	939	1,192	245	2,607	5,749
<b>Avg. Annual Affected Small Businesses as a % of Sector Total (4)</b>	g = e / f	0.00%	0.00%	0.00%	0.43%	0.33%	0.02%	0.41%	0.18%	0.19%
<b>Total Impact to Small Businesses In Sector (see Table A-4)</b>	h	\$108	\$0	\$0	\$33,853,703	\$123,355,230	\$4,523,193	\$11,952,855	\$36,334,667	\$210,019,756
<b>Small Business Impact / Project</b>	i = h / d	\$269,976	n/a	n/a	\$941,451	\$1,897,381	\$779,175	\$572,263	\$377,742	\$938,200
<b>Annualized Small Business Impact / Project (5)</b>	j	\$65,845	n/a	n/a	\$229,611	\$462,754	\$190,034	\$139,570	\$92,128	\$228,818
<b>Avg. Annual Sales per Small Business (see Table A-2)</b>	k	\$1,751,029	\$1,629,218	\$1,644,444	\$1,629,218	\$1,568,313	\$1,644,444	\$1,537,860	\$1,629,218	\$1,620,896
<b>Per Project Impact as a Percent of Total Sales</b>	= j / k	3.76%	n/a	n/a	14.09%	29.51%	11.56%	9.08%	5.65%	14.12%

(1) Actual calculations may include rounding.

(2) Based on annual CEQA documents in County as reported by the Ceqanet database (accessed on-line as [www.ceqanet.ca.gov/querform.asp?](http://www.ceqanet.ca.gov/querform.asp?))

(3) Based on proportion of land development businesses that are small. This is conservative since large businesses are likely to conduct more projects than small businesses.

(4) Assumes each project is conducted by a separate business. In reality the same business might conduct several projects.

(5) Small business costs are annualized over 5 years based on a 7% discount rate to account for the manner and duration that these costs are likely to be absorbed.

**Table A-7**  
**Impact to Small Business in the Fruit and Nut Farm Sector within Proposed Critical Habitat**  
**Economic Analysis of Critical Habitat Designation for the Arroyo Toad**

Impact Category	Formula	Monterey	Santa Barabara	Ventura	Riverside	San Diego	Orange	San Bernardino	Los Angeles	Total
<b>Total Impact borne by Fruit and Nut Farms (1)</b>										
Project Modification Costs		\$0	\$137,491	\$209,654	\$11,451	\$74,817	\$0	\$0	\$1,526	\$434,939
Administrative Costs		\$0	\$419	\$908	\$372	\$660	\$0	\$0	\$13	\$2,373
<b>Adjusted Total (2)</b>	<b>a</b>	<b>\$0</b>	<b>\$68,955</b>	<b>\$105,281</b>	<b>\$5,912</b>	<b>\$37,738</b>	<b>\$0</b>	<b>\$0</b>	<b>\$770</b>	<b>\$218,656</b>
<b>Annual Impact (3)</b>	<b>b</b>	<b>\$0</b>	<b>\$6,364</b>	<b>\$9,716</b>	<b>\$546</b>	<b>\$3,483</b>	<b>\$0</b>	<b>\$0</b>	<b>\$71</b>	<b>\$20,179</b>
<b>Percent of Sector Revenues Attributable To Small Business (See Table A-2)</b>	<b>c</b>	<b>35%</b>	<b>32%</b>	<b>39%</b>	<b>31%</b>	<b>56%</b>	<b>36%</b>	<b>68%</b>	<b>58%</b>	<b>--</b>
<b>Impacts to Small Business</b>										
Total	d = a * c	\$0	\$21,752	\$41,149	\$1,843	\$21,027	\$0	\$0	\$447	\$86,218

(1) Total impacts to water suppliers are adjusted to reflect costs that are expected to be passed on to the Fruit and Nut Sector based on Table 18.

(2) Reduced by 50% since not more than half of the events are likely to occur. At this point in time, it is impossible to determine which water management areas the Service will pursue.

(3) Small business costs are annualized over 21 years based on a 7% discount rate.

**Table A-8**  
**Number of Small Fruit and Nut Farms Affected and Size of Impact per Farm in Proposed Critical Habitat**  
**Economic Analysis of Critical Habitat Designation for the Arroyo Toad**

Impact Category	Formula (1)	Monterey	Santa Barabara	Ventura	Riverside	San Diego	Orange	San Bernardino	Los Angeles	Total
<b>Total # of Affected Farms (2)</b>	a	0.0	0.7	1.4	0.1	4.7	0.0	0.0	0.6	7
<b>Avg. Annual # of Affected Farms</b>	b = a / 21 years	0.0	0.0	0.1	0.0	0.2	0.0	0.0	0.0	0.4
<b>% of Farms categorized as Small Businesses (see Table A-2)</b>	c	79%	77%	82%	76%	90%	80%	94%	91%	--
<b>Total # Of Affected Small Farms</b>	d = a * c	0.0	0.6	1.2	0.1	4.2	0.0	0.0	0.5	7
<b>Avg. Annual # Of Affected Small Farm Businesses</b>	e = d / 21 years	0.0	0.0	0.1	0.0	0.2	0.0	0.0	0.0	0.3
<b>Number of Small Businesses In Sector (see Table A-2)</b>	f	61	89	179	94	153	52	45	109	782
<b>Avg. Annual Affected Small Businesses as a % of Sector Total (3)</b>	g = e / f	0.00%	0.03%	0.03%	0.00%	0.13%	0.00%	0.00%	0.02%	0.04%
<b>Total Impact to Small Businesses In Sector (see Table A-7)</b>	h	\$0	\$21,752	\$41,149	\$1,843	\$21,027	\$0	\$0	\$447	\$86,218
<b>Small Business Impact / Farm</b>	i = h / d	n/a	\$38,962	\$35,522	\$25,950	\$5,021	n/a	n/a	\$819	\$13,222
<b>Avg. Annual Sales per Small Business (see Table A-2)</b>	j	\$514,433	\$478,647	\$483,120	\$478,647	\$460,753	\$483,120	\$451,807	\$478,647	\$477,714
<b>Per Farm Impact as a Percent of Total Sales</b>	= i / j	n/a	8.14%	7.35%	5.42%	1.09%	n/a	n/a	0.17%	2.77%

(1) Actual calculations may include rounding.

(2) Assumes that the percentage of Fruit and Nut Farms served by water suppliers affected by CHD is proportional to the percentage of land area affected by CHD in each county.

(3) Assumes each project is conducted by a separate business. In reality the same business might conduct several projects.

**Table A-9**  
**Impact to Small Business in the Cattle Ranching Sector within Proposed Critical Habitat**  
**Economic Analysis of Critical Habitat Designation for the Arroyo Toad**

Impact Category	Formula	Monterey	Santa Barabara	Ventura	Riverside	San Diego	Orange	San Bernardino	Los Angeles	Total
<b>Total Impact</b>										
Project Modification Costs		\$0	\$206,071	\$79,009	\$0	\$373,975	\$0	\$22,122	\$0	681,177
Administrative Costs		\$0	\$46,257	\$69,386	\$0	\$323,802	\$0	\$23,129	\$0	462,574
<b>Total</b>	<b>a</b>	<b>\$0</b>	<b>\$252,328</b>	<b>\$148,395</b>	<b>\$0</b>	<b>\$697,777</b>	<b>\$0</b>	<b>\$45,251</b>	<b>\$0</b>	<b>1,143,751</b>
<b>Annual Impact (1)</b>	<b>b</b>	<b>\$0</b>	<b>\$23,287</b>	<b>\$13,695</b>	<b>\$0</b>	<b>\$64,397</b>	<b>\$0</b>	<b>\$4,176</b>	<b>\$0</b>	<b>\$105,556</b>
<b>Percent of Sector Revenues Attributable To Small Business (See Table A-2)</b>	<b>c</b>	<b>16%</b>	<b>15%</b>	<b>42%</b>	<b>17%</b>	<b>44%</b>	<b>15%</b>	<b>22%</b>	<b>31%</b>	<b>--</b>
<b>Impacts to Small Business</b>										
Total	<b>d = a * c</b>	<b>\$0</b>	<b>\$37,897</b>	<b>\$62,683</b>	<b>\$0</b>	<b>\$308,448</b>	<b>\$0</b>	<b>\$10,159</b>	<b>\$0</b>	<b>\$419,187</b>

(1) Small business costs are annualized over 21 years based on a 7% discount rate.

**Table A-10**  
**Number of Small Viticulture Firms Affected and Size of Impact per Firm in Proposed Critical Habitat**  
**Economic Analysis of Critical Habitat Designation for the Arroyo Toad**

Impact Category	Formula (1)	Monterey	Santa Barabara	Ventura	Riverside	San Diego	Orange	San Bernardino	Los Angeles	Total
<b>Total # of Affected Projects (2)</b>	a	0	2	3	0	14	0	1	0	20
<b>Avg. Annual # of Affected Projects</b>	b = a / 21 years	0.0	0.1	0.1	0.0	0.7	0.0	0.0	0.0	1.0
<b>% of Projects Conducted By Small Businesses (see Table A-2)</b>	c	86%	85%	96%	87%	96%	86%	90%	94%	--
<b>Total # Of Affected Small Business Projects</b>	d = a * c	0.0	1.7	2.9	0.0	13.5	0.0	0.9	0.0	19
<b>Avg. Annual # Of Affected Small Business Projects</b>	e = d / 21 years	0.0	0.1	0.1	0.0	0.6	0.0	0.0	0.0	0.9
<b>Number of Small Businesses In Sector (see Table A-2)</b>	f	25	29	24	34	26	12	19	30	199
<b>Avg. Annual Affected Small Businesses as a % of Sector Total (3)</b>	g = e / f	0.00%	0.28%	0.57%	0.00%	2.47%	0.00%	0.23%	0.00%	0.45%
<b>Total Impact to Small Businesses In Sector (see Table A-9)</b>	h	\$0	\$37,897	\$62,683	\$0	\$308,448	\$0	\$10,159	\$0	\$419,187
<b>Small Business Impact / Project</b>	i = h / d	n/a	\$22,216	\$21,765	n/a	\$22,879	n/a	\$11,228	n/a	\$22,095
<b>Avg. Annual Sales per Small Business (see Table A-2)</b>	j	\$528,343	\$491,589	\$496,183	\$491,589	\$473,211	\$496,183	\$464,023	\$491,589	\$492,004
<b>Per Project Impact as a Percent of Total Sales</b>	= i / j	n/a	4.52%	4.39%	n/a	4.83%	n/a	2.42%	n/a	4.49%

(1) Actual calculations may include rounding.

(2) Assumes each affected grazing allotment involves one project.

(3) Assumes each project is conducted by a separate business. In reality the same business might conduct several projects.

Table A-11  
Potential Impact to Small Governments  
Economic Analysis of Critical Habitat Designation for the Arroyo Toad

Impact Category	Formula (1)	Monterey	Santa Barabara	Ventura	Riverside	San Diego	Orange	San Bernardino	Los Angeles	Total
<b>Total Impact to Small Governments Administrative Costs</b>	a	\$0	\$0	\$0	\$0	\$0	\$160,000	\$0	\$0	\$160,000
<b>Total # of Affected Governments</b>	b	0	0	0	0	0	2	0	0	2
<b>Avg. Annual # of Affected Small Government Projects</b>	c = b / 21 years	0.0	0.0	0.0	0.0	0.0	0.1	0.0	0.0	0.1
<b>Number of Small Governments (2)</b>	d	11	6	5	17	5	15	11	50	120
<b>Avg. Annual Affected Small Government as a % of County Total</b>	e = c / d	0.00%	0.00%	0.00%	0.00%	0.00%	0.63%	0.00%	0.00%	0.08%
<b>Small Government Impact / Government</b>	f = a / b	n/a	n/a	n/a	n/a	n/a	\$80,000	n/a	n/a	\$80,000
<b>Avg. General Fund Budget (3)</b>	g	n/a	n/a	n/a	n/a	n/a	\$15,000,000	n/a	n/a	\$15,000,000
<b>Impact to Small Government as a Percent of Annual Government Budget</b>	h= f /g	n/a	n/a	n/a	n/a	n/a	0.53%	n/a	n/a	0.53%

(1) Actual calculations may include rounding.

(2) Based on CA Department of Finance, 2003 Population Estimates.

(3) Based on 2003-2004 General Fund Budgets for San Juan Capistrano and Rancho Santa Margarita.

120 As calculated in **Table A-5**, small land developers with projects within the proposed CHD are expected to bear an annual impact per project of between roughly \$37,000 and \$460,000. The number of small land developers affected annually ranges from almost zero to 1 percent of the county total. For those small land developers that are impacted, the average annualized cost per project is roughly 2 to 29 percent of the typical annual sales for a small firm in the land subdivision sector.

130 As presented in **Table A-6**, small land developers with projects within habitat proposed for exclusion are expected to bear an annual impact per project of between roughly \$66,000 and \$463,000. The number of small land developers affected annually is less than one percent of the small land development firms in each county. For those small land developers that are impacted, the average cost per project is roughly 4 to 30 percent of the typical annual sales for a small firm in the land subdivision sector.

As shown in **Table A-8**, small fruit and nut farms within the proposed CHD are expected to bear an impact per farm of between roughly \$800 and \$39,000.<sup>83</sup> The number of small fruit and nut farms affected annually is less than one percent of the small fruit and nut farms in each county. For those small fruit and nut farms that are impacted, the average cost per farm is between almost zero and roughly eight percent of the typical annual sales for a small farm in the sector.

140 As revealed in **Table A-10**, small cattle ranching businesses operating within the proposed CHD are expected to bear an impact per project of between roughly \$11,000 and \$23,000.<sup>84</sup> The number of small cattle ranching operations affected annually is less than 2.5 percent of the cattle ranching businesses in each county. For those small cattle ranching businesses that are impacted, the average cost per project (i.e., grazing allotment) is less than five percent of the typical annual sales for a small business in the sector.

150 Only two small local governments are located in the study area, Rancho Santa Margarita and San Juan Capistrano. There is no record of consultations between the Service and the cities of Rancho Santa Margarita or San Juan Capistrano regarding the AT since the listing in 1994. Indeed, there is very little data for any city serving as the prime applicant in a consultation regarding the AT (with the exception of several BOs with the City of San Diego, which does not meet the SBA definition of small entity). In general, city governments may get involved in land use projects, and therefore section 7 consultations related to specific proposed actions or HCPs. To date, large governmental entities have been more active in pursuing HCPs in Southern California.

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<sup>83</sup> This analysis assumes that farmers incur costs in one year. In reality, costs might be borne over a number of years. This approach may overstate the impact of AT conservation activities on small fruit and nut farms.

<sup>84</sup> This analysis assumes that ranchers incur costs in one year. In reality, costs might be borne over a number of years. This approach may overstate the impact of AT conservation activities on small ranchers.

For the purposes of this analysis, it is assumed that each of the two small cities will consult as a prime applicant two times within the next 21 years. As shown in **Table A-11**, this would affect less than one percent of the total number of small governments in Orange County annually. In addition, the impact would constitute less than one percent of the annual budget for each of the two cities that meet SBA's small entity threshold.

## CAVEATS

The estimated impacts on small businesses provided above contain a number of important assumptions that are likely to overstate the actual economic impact to these entities. These include:

- **All property-owners in CH are developers:** As noted above, the analysis assumes that all affected property owners within the AT designation are also land developers. In reality, a large share of the affected property owners will sell their land to developers at a price that incorporates the expected cost of CH-related conservation activities. To the extent this occurs, property owners rather than small land developers will incur the costs estimated herein. As a result, impacts to small developers are likely overstated.
- **Each future project (i.e., development projects, farms, grazing allotment projects) is conducted by a separate small business:** The economic impact is based on an estimate of the number of future projects expected to occur within the proposed designation and assumes that each project is conducted by a separate business. To the extent that some of these projects are conducted by the same business, the total number of small businesses affected will be smaller than the amount estimated. However, since a small business is not likely to be conducting two projects within CH simultaneously, the annual impact per project will be the same.
- **Small land development firms are equally likely to undertake projects in CH as large land development firms:** This analysis assumes that small businesses own land slated for development within CH in the same proportion as small businesses occur in the land development sector. In fact, it is likely that large land development firms will undertake a greater proportion of the development projects in "greenfield" areas while small land development firms undertake a greater proportion "infill projects." Large firms are often better suited to undertake major projects located outside of urban areas as these projects tend to be greater in size and require additional effort to complete the planning and entitlement processes, compared to infill projects.



- **The number of affected small business projects is proportional to the number of small businesses:** As estimated in **Table A-2**, small businesses account for between 76 and 97 percent of the total firms in each sector but a much smaller percentage of total sales. However, the analysis assumes that small businesses will account for between 76 and 97 percent of future projects. To the extent that larger businesses account for a disproportionate share of total sector projects, as they do for total sector sales, the actual number of small businesses impacted may be smaller than the amount estimated.

## **POTENTIAL IMPACT TO THE ENERGY INDUSTRY**

Pursuant to Executive order Number 13211, Federal agencies are required to submit a summary of the potential effects of regulatory actions on the supply, distribution and use of energy. Two criteria are relevant to this analysis: 1) reductions in electricity production in excess of 1 billion kilowatt-hours per year or in excess of 500 megawatts of installed capacity and 2) increases in the cost of energy production in excess of one percent. This proposed CHD is expected to have minimal impacts on the energy industry.



**Economic &  
Planning Systems**

*Real Estate Economics*

*Regional Economics*

*Public Finance*

*Land Use Policy*

## APPENDIX B:

## REAL ESTATE DEVELOPMENT

## OFFSETTING COMPENSATION

The Service has conducted four historical AT consultations regarding development projects. The offsetting compensation associated with these projects is used to inform the analysis of future economic impacts of AT conservation efforts on developers and landowners. Specifically, the offsetting compensation ratio (i.e., the ratio of land set-aside for the AT to land impacted by development) is identified through examination of the BOs issued by the Service. The offsetting compensation ratios identified are averaged in order to provide a single offsetting compensation ratio that can be applied to future development projects expected to occur within CH/EH.

### 10 RANCHO VIEJO RESIDENTIAL DEVELOPMENT, SAN DIEGO COUNTY

The Service issued a BO in August of 2000 concluding that the proposed Rancho Viejo residential development is likely to jeopardize the continued existence of the AT and result in the destruction or adverse modification of proposed CH. To avoid jeopardizing the continued existence of the AT, the Service offered a reasonable prudent alternative that included the following offsetting compensation:

20 *The 77-acre parcel and the 50-acre upland preservation area shall be conserved and managed in perpetuity for the benefit of the AT by a land manager approved by the Service. Arundo control and enhancement of the riparian and upland habitat shall minimize impacts to the AT from the loss of 52 acres of upland habitat.*

The reasonable and prudent alternative suggests that the Service would be satisfied with an offsetting compensation ratio of 2.4:1. Due to litigation regarding the Service BO, the Rancho Viejo residential development has not yet been constructed.

### RANCHO LAS FLORES PLANNED COMMUNITY, HESPERIA, SAN BERNARDINO COUNTY

30 The Service issued a BO in April of 2003 concluding that the Rancho Las Flores Planned Community is not likely to jeopardize the continued existence of the AT and bald eagle. According to the Service BO, this conclusion was reached, in-part, because the proposed action includes the following offsetting compensation:

*Develop and implement a management program for 290 acres of habitat along Horsethief Canyon and the West Fork of the Mojave River with the goal of increasing the habitat quality of this area for the AT and bald eagle.*

The BO states that the Service is unable to quantify the precise amount of habitat that would be directly and permanently lost. The biological assessment (BA) estimates that approximately 1,015 acres would be lost or disturbed. The Service notes that this is likely an overestimate as ATs do not travel substantial distances in upland areas in the

40 desert. Nonetheless, using the 1,015 acre estimate of lost habitat, the 290 acre set-aside reveals an offsetting compensation ratio of 0.3:1.

## PALA GAMING FACILITY, SAN DIEGO COUNTY

The Service issued a BO in May of 2000 concluding that the Pala Gaming Facility is not likely to jeopardize the continued existence of the AT. According to the Service BO, this conclusion was reached in part because the proposed action includes the following offsetting compensation:

50 *In order to assist in the long term conservation of the AT populations on and near the reservation lands, the Pala Tribe will preserve in perpetuity an area equal to the upland terrace habitat impacted by the gaming facility project (approximately 20 acres). The preserved upland terrace habitat will occur in the San Luis Rey River watershed and may occur on Tribal lands.*

According to the BO, construction of the gaming facility will impact approximately 20 acres of upland habitat that the AT may use for foraging, burrowing, and dispersal. Thus, the proposed action outlines a 1:1 offsetting compensation ratio.

## RINCON GAMING FACILITY, SAN DIEGO COUNTY

60 The Service issued a BO in November of 2000 and a reinitiation of that BO in February of 2001 concluding that the Rincon Gaming Facility is not likely to jeopardize the continued existence of the AT, and is not likely to destroy or adversely modify CH. This conclusion was based, in-part, on the following offsetting compensation:

*The upland terrace directly adjacent to the San Luis Rey River channel that will be temporarily disturbed will be restored to upland habitat for ATs. Furthermore, Area B will be left intact, and preserved as upland habitat for the AT. This will result in 15 acres of upland habitat, directly adjacent to the stream channel that will be maintained for toad burrowing, foraging, and dispersal.*

70 *Impacts to the AT and its critical habitat will be offset through the acquisition and/or preservation of 53 acres of upland habitat. This area will be selected with concurrence from the Service, and will provide, in perpetuity, upland habitat for the AT within 1 kilometer of a known breeding site.*

According to the BO, the Rincon Gaming Facility will impact a total of 53 acres of upland habitat that AT use for foraging, burrowing, and dispersal. Thus, an offsetting compensation ratio of 1.3:1 is calculated.

## OFFSETTING COMPENSATION RATIO

Based on the offsetting compensation inferred from the four historical AT consultations on development projects, the average offsetting compensation is calculated to be 1.3:1.

80 This offsetting compensation ratio is applied to development forecasted to occur within CH/EH.

**Table B-1**  
**Value of Land Development Set-Aside in Critical Habitat**  
**Economic Analysis of Critical Habitat Designation for the Arroyo Toad**

CH Unit	County	Projected Development in Critical Habitat (Acres) [1]				
		Residential	Office	Retail	Industrial	Total
2	Santa Barbara	2.3	-	-	-	2.3
3	Santa Barbara	0.0	-	-	-	0.0
4	Ventura	0.1	-	-	-	0.1
5	Los Angeles	0.9	1.6	0.4	1.0	3.9
	<u>Ventura</u>	0.1	-	-	-	0.1
	Unit Total	0.9	1.6	0.4	1.0	4.0
6	Los Angeles	34.2	56.7	15.2	33.4	139.5
7	Los Angeles	34.9	102.0	27.3	60.2	224.4
8	Orange	2.2	8.6	2.7	5.8	19.4
9	Riverside	0.0	0.0	0.0	0.0	0.0
10	Orange	74.8	246.6	78.0	165.4	564.8
	<u>Riverside</u>					
	Unit Total	74.8	246.6	78.0	165.4	564.8
11	Orange	13.9	74.4	23.5	49.7	161.5
	<u>San Diego</u>	-	-	0.0	-	0.0
	Unit Total	13.9	74.4	23.5	49.7	161.5
12	San Diego	391.4	-	0.7	0.4	392.4
13	Riverside	0.6	2.5	1.0	1.5	5.6
	<u>San Diego</u>	325.2	-	0.1	-	325.3
	Unit Total	325.8	2.5	1.0	1.5	330.9
14	San Diego	1,296.6	0.0	14.4	3.8	1,314.8
15	San Diego	786.6	-	0.2	-	786.8
16	San Diego	1,654.5	-	2.0	2.5	1,659.0
17	San Diego	397.8	-	1.0	1.8	400.7
18	San Diego	927.2	0.1	2.4	2.4	932.2
19	San Diego	1,987.3	-	5.4	0.6	1,993.2
20	San Bernardino	11.2	13.0	4.9	8.7	37.7
21	Los Angeles	-	-	-	-	-
22	San Bernardino	75.5	126.4	47.5	84.4	333.7
23	Riverside	8.3	12.1	4.7	7.3	32.4
<b>Total</b>		<b>8,025.6</b>	<b>644.1</b>	<b>231.3</b>	<b>428.7</b>	<b>9,329.7</b>

(1) Based on information from regional forecasting entities (e.g. SCAG, SANDAG, MCAG, and SBCAG) and the US Census.

Table B-1 continued  
Value of Land Development Set-Aside in Critical Habitat  
Draft Economic Analysis of Critical Habitat Designation for the Arroyo Toad

CH Unit	Development Occurring in Critical Habitat (Acres) [2]				
	Residential	Office	Retail	Industrial	Total
2	1	--	--	--	1
3	0	--	--	--	0
4	0	0	0	0	0
5	0	1	0	0	2
	<u>0</u>	<u>0</u>	<u>0</u>	<u>0</u>	<u>0</u>
	0	1	0	0	2
6	17	28	8	17	70
7	17	51	14	30	112
8	1	4	1	3	10
9	0	0	0	0	0
10	37	123	39	83	282
	<u>0</u>	<u>0</u>	<u>0</u>	<u>0</u>	<u>0</u>
	37	123	39	83	282
11	7	37	12	25	81
	<u>0</u>	<u>0</u>	<u>0</u>	<u>0</u>	<u>0</u>
	7	37	12	25	81
12	195	0	0	0	196
13	0	1	0	1	3
	<u>162</u>	<u>0</u>	<u>0</u>	<u>0</u>	<u>162</u>
	163	1	1	1	165
14	648	0	7	2	657
15	393	0	0	0	393
16	826	0	1	1	829
17	199	0	1	1	200
18	463	0	1	1	466
19	993	0	3	0	996
20	6	6	2	4	19
21	0	0	0	0	0
22	38	63	24	42	167
23	4	6	2	4	16
<b>Total</b>	<b>4,008</b>	<b>322</b>	<b>116</b>	<b>214</b>	<b>4,660</b>

(2) Development occurring given on-site set-aside requirement takes place within the acres forecasted for development.

Table B-1 continued  
Value of Land Development Set-Aside in Critical Habitat  
Economic Analysis of Proposed CHD for the Arroyo Toad

CH Unit	Gross Acres Set-Aside for Arroyo Toad (3)				
	Residential	Office	Retail	Industrial	Total
2	1.44	--	--	--	1.44
3	0.01	--	--	--	0.01
4	0.03	0.00	0.00	0.00	0.03
5	0.55	1.02	0.27	0.60	2.45
	<u>0.03</u>	<u>0.00</u>	<u>0.00</u>	<u>0.00</u>	<u>0.03</u>
	0.59	1.02	0.27	0.60	2.48
6	21.40	35.45	9.49	20.92	87.26
7	21.84	63.81	17.09	37.65	140.38
8	1.39	5.41	1.71	3.61	12.12
9	0.00	0.00	0.00	0.00	0.01
10	46.81	154.29	48.83	103.47	353.40
	<u>0.00</u>	<u>0.00</u>	<u>0.00</u>	<u>0.00</u>	<u>0.00</u>
	46.81	154.29	48.83	103.47	353.40
11	8.69	46.54	14.72	31.08	101.03
	<u>0.00</u>	<u>0.00</u>	<u>0.00</u>	<u>0.00</u>	<u>0.00</u>
	8.69	46.54	14.72	31.08	101.03
12	244.87	0.00	0.41	0.25	245.53
13	0.40	1.57	0.61	0.95	3.53
	<u>203.47</u>	<u>0.00</u>	<u>0.04</u>	<u>0.00</u>	<u>203.51</u>
	203.87	1.57	0.65	0.95	207.04
14	811.25	0.01	9.01	2.40	822.66
15	492.18	0.00	0.11	0.00	492.29
16	1,035.21	0.00	1.26	1.55	1,038.02
17	248.91	0.00	0.65	1.13	250.69
18	580.15	0.08	1.53	1.52	583.27
19	1,243.45	0.00	3.35	0.36	1,247.15
20	6.98	8.13	3.05	5.43	23.60
21	0.00	0.00	0.00	0.00	0.00
22	47.24	79.10	29.69	52.79	208.82
23	5.22	7.57	2.92	4.56	20.27
<b>Total</b>	<b>5,022</b>	<b>403</b>	<b>145</b>	<b>268</b>	<b>5,838</b>

(3) Gross acres set aside are the sum of on-site and off-site acreage. Off-site acreage is assumed to occur within



Table B-1 continued  
Value of Land Development Set-Aside in Critical Habitat  
Economic Analysis of Proposed CHD for the Arroyo Toad

CH Unit	On-site Acres Set-Aside for Arroyo Toad				
	Residential	Office	Retail	Industrial	Total
2	1	--	--	--	1
3	0	--	--	--	0
4	0	0	0	0	0
5	0	1	0	0	2
	<u>0</u>	<u>0</u>	<u>0</u>	<u>0</u>	<u>0</u>
	0	1	0	0	2
6	17	28	8	17	70
7	17	51	14	30	112
8	1	4	1	3	10
9	0	0	0	0	0
10	37	123	39	83	283
	<u>0</u>	<u>0</u>	<u>0</u>	<u>0</u>	<u>0</u>
	37	123	39	83	283
11	7	37	12	25	81
	<u>0</u>	<u>0</u>	<u>0</u>	<u>0</u>	<u>0</u>
	7	37	12	25	81
12	196	0	0	0	196
13	0	1	0	1	3
	<u>163</u>	<u>0</u>	<u>0</u>	<u>0</u>	<u>163</u>
	163	1	1	1	166
14	649	0	7	2	658
15	394	0	0	0	394
16	828	0	1	1	830
17	199	0	1	1	201
18	464	0	1	1	467
19	995	0	3	0	998
20	6	7	2	4	19
21	0	0	0	0	0
22	38	63	24	42	167
23	4	6	2	4	16
<b>Total</b>	<b>4,017</b>	<b>322</b>	<b>116</b>	<b>215</b>	<b>4,670</b>

**Table B-1 continued**  
**Value of Land Development Set-Aside in Critical Habitat**  
**Economic Analysis of Proposed CHD for the Arroyo Toad**

CH Unit	Present Value Loss of On-Site Acres Set-Aside				
	Residential	Office	Retail	Industrial	Total
2	\$146,619	--	--	--	\$146,619
3	\$1,229	--	--	--	\$1,229
4	\$5,741	\$0	\$0	\$0	\$5,741
5	\$76,697	\$191,245	\$69,301	\$16,143	\$353,386
	\$5,807	\$0	\$0	\$0	<u>\$5,807</u>
	\$82,504	\$191,245	\$69,301	\$16,143	\$359,193
6	\$2,979,033	\$6,648,709	\$2,409,281	\$561,231	\$12,598,254
7	\$3,039,739	\$11,967,595	\$4,336,274	\$1,010,158	\$20,353,767
8	\$143,438	\$946,414	\$468,185	\$110,160	\$1,668,197
9	\$109	\$475	\$222	\$38	\$844
10	\$4,819,061	\$27,008,119	\$13,373,598	\$3,157,392	\$48,358,170
	\$0	\$0	\$0	\$0	<u>\$0</u>
	\$4,819,061	\$27,008,119	\$13,373,598	\$3,157,392	\$48,358,170
11	\$894,660	\$8,147,044	\$4,030,275	\$948,303	\$14,020,282
	\$0	\$0	\$81	\$0	<u>\$81</u>
	\$894,660	\$8,147,044	\$4,030,356	\$948,303	\$14,020,363
12	\$37,891,229	\$0	\$100,351	\$12,264	\$38,003,844
13	\$32,368	\$230,372	\$107,457	\$18,443	\$388,640
	\$31,485,071	\$0	\$10,670	\$0	<u>\$31,495,741</u>
	\$31,517,439	\$230,372	\$118,127	\$18,443	\$31,884,381
14	\$125,533,701	\$1,061	\$2,194,769	\$116,070	\$127,845,601
15	\$76,160,919	\$0	\$25,810	\$0	\$76,186,729
16	\$160,189,643	\$0	\$307,800	\$75,112	\$160,572,555
17	\$38,517,175	\$0	\$157,820	\$54,532	\$38,729,526
18	\$89,773,007	\$12,315	\$373,033	\$73,464	\$90,231,818
19	\$192,412,645	\$0	\$816,550	\$17,227	\$193,246,423
20	\$566,990	\$1,191,267	\$540,809	\$105,677	\$2,404,742
21	\$0	\$0	\$0	\$0	\$0
22	\$3,836,728	\$11,584,685	\$5,259,268	\$1,027,659	\$21,708,341
23	\$418,455	\$1,108,247	\$516,936	\$88,722	\$2,132,360
<b>Total</b>	<b>\$768,930,064</b>	<b>\$69,037,548</b>	<b>\$35,098,487</b>	<b>\$7,392,597</b>	<b>\$880,458,696</b>

**Table B-2**  
**Value of Land Development Set-Aside in Excluded Essential Habitat**  
**Economic Analysis of Critical Habitat Designation for the Arroyo Toad**

EH Unit	County	Projected Development in Excluded Essential Habitat (Acres) [1]				
		Residential	Office	Retail	Industrial	Total
1	Monterey	0.0	0.0	0.0	0.0	0.0
6	Los Angeles	355.6	119.2	31.9	70.4	577.2
8	Orange	12.3	47.5	15.0	31.7	106.5
9	Riverside	109.4	168.3	64.9	101.4	443.9
10	Orange	0.0	0.0	0.0	0.0	0.0
11	Orange	0.0	0.1	0.0	0.0	0.2
	San Diego	0.0	0.0	0.0	0.0	0.0
	Unit Total	0.0	0.1	0.0	0.0	0.2
12	San Diego	0.3	0.0	0.0	0.0	0.3
13	Riverside	108.5	396.4	152.9	238.7	896.5
14	San Diego	0.4	0.0	0.0	0.0	0.4
16	San Diego	644.6	0.0	8.9	0.7	654.2
17	San Diego	974.7	0.0	2.0	16.4	993.1
18	San Diego	285.7	0.0	0.2	0.3	286.2
19	San Diego	538.6	0.0	0.6	0.7	539.9
22	San Bernardino	63.3	124.1	46.6	82.8	316.9
<b>Total</b>		<b>3,093.5</b>	<b>855.6</b>	<b>323.0</b>	<b>543.1</b>	<b>4,815.2</b>

(1) Based on information from regional forecasting entities (e.g. SCAG, SANDAG, MCAG, and SBCAG) and the US Census.

Table B-2 continued

## Value of Land Development Set-Aside in Excluded Essential Habitat

## Draft Economic Analysis of Critical Habitat Designation for the Arroyo Toad

CH Unit	Development Occurring in Excluded Essential Habitat (Acres) [2]				
	Residential	Office	Retail	Industrial	Total
1	0	0	0	0	0
6	178	60	16	35	288
8	6	24	8	16	53
9	55	84	32	51	222
10	0	0	0	0	0
11	0	0	0	0	0
	<u>0</u>	<u>0</u>	<u>0</u>	<u>0</u>	<u>0</u>
	0	0	0	0	0
12	0	0	0	0	0
13	54	198	76	119	448
14	0	0	0	0	0
16	322	0	4	0	327
17	487	0	1	8	496
18	143	0	0	0	143
19	269	0	0	0	270
22	32	62	23	41	158
<b>Total</b>	<b>1,545</b>	<b>427</b>	<b>161</b>	<b>271</b>	<b>2,405</b>

(2) Development occurring given on-site set-aside requirement occurs within the acres forecasted for development.

Table B-2 continued

## Value of Land Development Set-Aside in Excluded Essential Habitat

## Draft Economic Analysis of Critical Habitat Designation for the Arroyo Toad

EH Unit	Gross Acres Set-Aside for Arroyo Toad [3]				
	Residential	Office	Retail	Industrial	Total
1	0.0	0.0	0.0	0.0	0.0
6	222.5	74.6	20.0	44.0	361.1
8	7.7	29.7	9.4	19.8	66.6
9	68.5	105.3	40.6	63.4	277.8
10	0.0	0.0	0.0	0.0	0.0
11	0.0	0.0	0.0	0.0	0.1
	<u>0.0</u>	<u>0.0</u>	<u>0.0</u>	<u>0.0</u>	<u>0.0</u>
	0.0	0.0	0.0	0.0	0.1
12	0.2	0.0	0.0	0.0	0.2
13	67.9	248.0	95.6	149.4	560.9
14	0.2	0.0	0.0	0.0	0.2
16	403.3	0.0	5.6	0.4	409.3
17	609.9	0.0	1.2	10.2	621.4
18	178.8	0.0	0.1	0.2	179.1
19	337.0	0.0	0.4	0.4	337.8
22	39.6	77.7	29.1	51.8	198.3
<b>Total</b>	<b>1,936</b>	<b>535</b>	<b>202</b>	<b>340</b>	<b>3,013</b>

(3) Gross acres set aside are the sum of on-site and off-site acreage. Off-site acreage is assumed to occur within the flood plain.

Table B-2 continued

## Value of Land Development Set-Aside in Excluded Essential Habitat

## Draft Economic Analysis of Critical Habitat Designation for the Arroyo Toad

EH Unit	On-Site Acres Set-Aside for Arroyo Toad				
	Residential	Office	Retail	Industrial	Total
1	0	0	0	0	0
6	178	60	16	35	289
8	6	24	8	16	53
9	55	84	32	51	222
10	0	0	0	0	0
11	0	0	0	0	0
	<u>0</u>	<u>0</u>	<u>0</u>	<u>0</u>	<u>0</u>
	0	0	0	0	0
12	0	0	0	0	0
13	54	198	77	120	449
14	0	0	0	0	0
16	323	0	4	0	327
17	488	0	1	8	497
18	143	0	0	0	143
19	270	0	0	0	270
22	32	62	23	41	159
<b>Total</b>	<b>1,548</b>	<b>428</b>	<b>162</b>	<b>272</b>	<b>2,410</b>

**Table B-2 continued**  
**Value of Land Development Set-Aside in Excluded Essential Habitat**  
**Economic Analysis of Proposed CHD for the Arroyo Toad**

EH Unit	Present Value Loss of On-Site Acres Set-Aside				
	Residential	Office	Retail	Industrial	Total
1	\$111	\$0	\$0	\$0	\$111
6	\$30,972,433	\$13,992,661	\$5,070,497	\$1,181,235	\$51,216,825
8	\$790,260	\$5,203,184	\$2,574,010	\$605,637	\$9,173,091
9	\$5,484,145	\$15,419,590	\$7,192,334	\$1,234,431	\$29,330,500
10	\$0	\$0	\$0	\$0	\$0
11	\$870	\$7,920	\$3,918	\$922	\$13,629
	<u>\$0</u>	<u>\$0</u>	<u>\$0</u>	<u>\$0</u>	<u>\$0</u>
	\$870	\$7,920	\$3,918	\$922	\$13,629
12	\$27,211	\$0	\$23	\$10	\$27,244
13	\$5,439,888	\$36,322,754	\$16,942,681	\$2,907,868	\$61,613,190
14	\$37,803	\$0	\$195	\$5	\$38,002
16	\$62,408,925	\$0	\$1,362,146	\$21,549	\$63,792,620
17	\$94,372,039	\$0	\$302,912	\$495,940	\$95,170,891
18	\$27,665,532	\$0	\$25,587	\$9,554	\$27,700,672
19	\$52,145,989	\$0	\$94,419	\$20,127	\$52,260,535
22	\$3,217,567	\$11,373,780	\$5,163,539	\$1,008,951	\$20,763,837
	<b>\$282,562,772</b>	<b>\$82,319,888</b>	<b>\$38,732,260</b>	<b>\$7,486,228</b>	<b>\$411,101,147</b>



**Economic &  
Planning Systems**

*Real Estate Economics*

*Regional Economics*

*Public Finance*

*Land Use Policy*

## APPENDIX C:

### WATER AGENCY CASE STUDIES



## WATER AGENCY CASE STUDIES

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### **PYRAMID LAKE/PIRU CREEK**

#### **BACKGROUND**

Pyramid Lake, a major reservoir within the California State Water Project (SWP), is managed by the California Department of Water Resources (DWR). DWR releases water from Pyramid Lake to Piru Creek, which conveys water to Piru Lake. Piru Lake water is managed by the United Water Conservation District (UWCD). UWCD provides water to Piru Lake for recreation during summer months and releases water to “spreading areas” for groundwater recharge during autumn months.

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When the AT was listed in 1994, the Service, DWR, California Department of Fish and Game, UWCD, and the US Forest Service agreed to an interim flow release schedule intended to sustain the existing Piru Creek population of AT. In 2003, the Service determined that the artificial summer flows adversely affect AT by diminishing habitat and increasing populations of predatory species. In order to avoid unauthorized take of AT, DWR proposed temporary operating guidelines for March 2004 through March 2005 under which SWP water deliveries are permitted from June 16 through August 31 and November 1 and February 28. Furthermore, in the future, the Service would like DWR to manage water releases from Pyramid Lake to more closely mimic the natural flow regime.

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According to DWR, a natural flow regime in Piru Creek may constrain the supply of water available to the UWCD.<sup>85</sup> The UWCD has rights to the natural flow of Piru Creek. Additionally, UWCD exercises a SWP contract for 3,150 acre feet of (Table A) water in dry years. Both natural flows and SWP water are delivered through Piru Creek. The nearby City of Ventura and Casitas Municipal Water District (CMWD) also possess contracts for 15,000 acre feet of SWP water. Currently, these contracts are not exercised. UWCD has entered into negotiations with the City of Ventura and CMWD regarding procurement of the unused SWP contracts. Should UWCD reach an agreement with the City of Ventura and CMWD, UWCD may require conveyance of up to 18,150 acre feet of SWP water on top of natural flow in wet years.<sup>86</sup> It is unlikely that the UWCD Piru Creek natural flow rights and SWP contract water (above the 3,150 acre feet) can be supplied via Piru Creek without severe habitat degradation.

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<sup>85</sup> Personal communication with Eva Bagley, Licensing and Regulatory Chief, California Department of Water Resources, February 13, 2004.

<sup>86</sup> Note that the SWP contract amounts are rarely delivered at maximum levels. The amounts in “Table A” of the contracts are used for apportionment of the water available in a given year. EPS accounts for this in the Piru Creek analysis.

## ANALYSIS OF FLOWS

EPS analysis of historical flows in Piru Creek (above Pyramid Lake) and the DWR Piru Creek temporary operating agreement suggests that constrained flow during the AT breeding season results in reallocation of water releases to winter months. To analyze water conveyance in Piru Creek, EPS developed a model of the DWR Piru Creek temporary operating agreement. This model considers flow constraints outlined in the temporary agreement. Specifically, the agreement calls for the following:

- March 15 to April 1: DWR will gradually ramp up stream releases, by approximately 1 cfs<sup>87</sup> per day, to 25 cfs.
- April 1 through June 15: DWR will keep stream releases constant at 25 cfs. The only exception for the period of March 15 through June 15 is as follows: if natural storm events occur during this period, DWR can release storm flows as they occur, simulating the natural hydrograph as much as possible, subject to operation and safety constraints. The Service will not hold DWR liable for take of ATs caused by natural events during the breeding season.
- Water deliveries to UWCD can be made either during the period of June 16 through August 31, provided that with the exception of natural storm flow releases, total stream releases do not exceed 35 cfs; or during the period of November 1 through February 28.
- September 1 through October 9: DWR will gradually ramp stream releases back down to 5 cfs.
- October 10 through March 14: DWR will maintain a minimum winter base flow of 5 cfs.
- DWR will release all large flood events as they occur, regardless of the time of year, not holding back any such flows to recoup water from summer stream releases. A large flood event will be defined as flows of 1,000 cfs or more on Upper Piru Creek.

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<sup>87</sup> cubic feet per second

The EPS model of this agreement is outlined in **Table C-1** below.

Table C-1 Piru Creek Temporary Operating Agreement Model				
Start Date	End Date	Days	Maximum Flow (CFS)*	Acre Feet
15-Mar	31-Mar	17	15	505.79
1-Apr	15-Jun	76	25	3,768.60
16-Jun	31-Aug	77	35	5,345.45
1-Sep	9-Oct	39	15	1,160.33
10-Oct	14-Mar	156	UNLIMITED	UNLIMITED
*Excludes large storm events				

70 EPS analysis of published daily mean streamflow data for Upper Piru Creek (USGS 11109375 PIRU C BL BUCK C NR PYRAMID LK CA) reveals that in an average water year, DWR may need to release approximately at 96 cfs for the 156 days between October 10 and March 14 to receive natural flows and SWP water. To arrive at this estimate, EPS examined 15 years of streamflow data collected between 1977 and 2001. EPS estimates total annual flows for each of the 15 years in order to determine the average annual volume of the UWCD natural flow right. To account for large storm flows (>1,000 cfs), which are not constrained by the DWR temporary operating agreement, EPS removes these flows from the average annual flow calculation. Estimated annual flows in Upper Piru Creek, excluding large storm flows, yield between 1,579 acre feet (1990) and 83,389 acre feet (1993). The average annual natural flow, excluding large storm events, is 31,426 acre feet. The very large variance in these flow estimates reflects natural meteorological variability.

80 As previously described, UWCD obtains SWP water deliveries on top of their natural flow right. If UWCD obtains SWP water contracts from the City of Ventura and CMWD, UWCD will possess SWP contracts for 18,150 acre feet of SWP water.<sup>88</sup> It is likely that the full contract amount will only be delivered in the wettest years. It is reasonable to expect that UWCD will receive delivery of one-half of their SWP contract amount in an average year. Thus, EPS assumes that UWCD will require conveyance of 9,075 acre feet of SWP water in an average year. In sum, the expected annual 9,075 acre feet of SWP water and the expected annual natural flow of 31,426 acre feet (excluding flow from large storm events) will be subject to the Piru Creek temporary operating agreement described above.

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<sup>88</sup> EPS assumes a transfer of SWP contracts that increases the water volume delivered to UWCD. This is not based on historical SWP deliveries. The projected change is based on Personal Communication with John Dickenson, UWCD, March 29, 2004.

## 90 ESTIMATED ECONOMIC IMPACTS

Given the March 15 through October 9 maximum flow constraints described in the Piru Creek temporary operating agreement, EPS estimates that DWR will be able to release a maximum of 10,780 acre feet over that period. The operating agreement describes a minimum flow for October 10 through March 14. Thus, it is assumed that DWR will move any additional water (i.e., remaining natural flows owed to UWCD and/or SWP water) during this period. In an average year, the additional water allocation is expected to be 29,721 acre feet (i.e.,  $31,426 + 9,075 - 10,780$ ). Delivering 29,721 acre feet to UWCD during the 156 day period from October 10 through March 14 will require daily mean streamflow of 96 cfs. It is possible that streamflow of approximately 96 cfs, a significant departure from the natural hydrology of the stream, would have unacceptable consequences on the Piru Creek streambed and habitat.

If projected future water delivery via Piru Creek is constrained by the presence of the AT and AT habitat, discussions with UWCD staff indicate that UWCD would need to build a pipeline from nearby Castaic Lake to Piru Lake.<sup>89</sup> Piru Creek currently represents the only source of water available to UWCD. Castaic Lake is the closest feasible connection to the SWP and the least costly potential additional water supply route available to UWCD.

According to UWCD, \$50 million is a reasonable estimate of cost for the pipeline from Castaic Lake to Piru Lake.<sup>90</sup> A 1992 engineering evaluation estimated the cost of a pipeline between Castaic Lake and Piru Lake to be \$22.6 million.<sup>91</sup> UWCD states that steel pipeline construction and right of way costs have at least doubled since 1992. Thus, UWCD suggests that \$45.2 million would be a low estimate and \$50 million would be a reasonable estimate of the pipeline cost. According to UWCD, the pipeline would be paid for over 30 years with 5 percent interest. EPS estimates that the \$50 million project would cost approximately \$3.25 million per year given these parameters.

Due to additional SWP hydropower generation between Pyramid Lake and Castaic Lake, water from Castaic Lake costs less than water from Pyramid Lake. Cost savings on water purchased from Castaic Lake will offset the cost of the pipeline. According to UWCD, the current cost of water is \$133.09 and \$109.11 per acre foot from Pyramid Lake and Castaic Lake, respectively. Assuming UWCD acquires SWP contracts for 18,150 acre feet, in an average year (9,075 acre feet delivered) UWCD will save approximately \$220,000 by purchasing SWP water at Castaic Lake. Cost savings on water purchases at Castaic Lake reduces the annual cost of the pipeline to just over \$3 million per year.

In addition, Piru Creek supports a robust trout fishery. Reductions in stream flow may have detrimental impacts on the fishery. DWR is currently researching the effect of potential Service requirements on the fishery and recreational use of the fishery. To

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<sup>89</sup> Personal communication with John Dickenson, UWCD, March 29, 2004.

<sup>90</sup> Personal communication with John Dickenson, UWCD, March 29, 2004.

<sup>91</sup> UWCD cites FEIR Joint Agencies Water Supply Project, Appendices D and E.

whatever degree flow constraints in Piru Creek affect the quality of the fishery there or recreational pressure, there are likely to be economic impacts not captured by this analysis.

## **JAMESON LAKE/SANTA YNEZ RIVER**

### **BACKGROUND**

Jameson Lake is managed by the Montecito Water District (MWD). MWD is located in the southern coastal portion of Santa Barbara County and includes the unincorporated communities of Montecito and Summerland. Jameson Lake captures drainage from the local watershed contained within Los Padres National Forest and accounts for approximately 40 percent of MWD's overall water supply. MWD's service area encompasses approximately 14.5 square miles of suburban residential and limited commercial/ agricultural lands with an estimated population of 17,750. Jameson Lake is the sole source of water supply for about 35 percent of MWD's total service area. SWP water is available to the remaining 65 percent of MWD's service area.

Currently, Juncal Dam at Jameson Lake is not capable of controlled water release. Discharges from Jameson Lake at the Juncal Dam only occur when water spills from the dam during large storm events. Other than storm spills, there are no releases from Jameson Lake to the Santa Ynez River. Water from Jameson Lake is conveyed via pipeline to Doulton Tunnel.

The Service may request dam modifications that enable controlled release from Juncal Dam and natural in-stream flows during the AT breeding season. To achieve natural flow in the Santa Ynez below Jameson Lake, MWD would need to undertake capital improvements (e.g., inlet/outlet works and pumping/control infrastructure) to the dam. If the Service requests modifications to Juncal Dam and MWD management, costs will include both infrastructure costs and water supply replacement costs.<sup>92</sup>

### **ESTIMATED ECONOMIC IMPACTS**

Natural flow above Jameson Lake is unknown.<sup>93</sup> EPS assumes 8.5 cfs will be required during the breeding season. This flow rate is the mean daily flow rate measured on the nearby Upper Castaic Creek (USGS 11108075 CASTAIC C AB FISH C NR CASTAIC CA) during the AT breeding season. Flow of 8.5 cfs from March 15 through June 15 (93 days) results in a total release of 1,568 acre feet. Given that the current storage capacity in

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<sup>92</sup> Water released from Jameson to the Santa Ynez River may be reclaimed at Cachuma Reservoir located downstream. To whatever degree MWD is able to reclaim water at Cachuma, estimated water replacement costs will be offset.

<sup>93</sup> USGS gauging station data is available from 1994 through 1999 but data include flows from a local diversion, not natural flows exclusively. MWD has not provided data requested regarding the diversion and natural flows.

Jameson Lake is only 2,000 acre feet, additional infrastructure may be needed to supply water to the 35 percent of the MWD that are currently served exclusively by Jameson Lake Water.<sup>94</sup>

170 Purchase of SWP contract water will be necessary to replace local supplies provided for AT breeding. Currently, MWD pays \$2,305 per acre foot for SWP water.<sup>95</sup> Thus, the expected replacement cost of 1,568 acre feet of water is approximately \$3.6 million.

EPS assumes a \$10 million expenditure on capital improvements to allow controlled release at Jameson. Over 30 years at 5 percent interest, this expenditure results in an annual payment of approximately \$650,500. Water replacement costs and capital costs combined result in an annual cost impact of roughly \$4.3 million.

## **CASTAIC LAKE/CASTAIC CREEK**

### **BACKGROUND**

180 Castaic Lake is managed by DWR. It is located at the terminus of the west branch of the SWP, in Los Angeles County, and supplies water to Castaic Lake Water Agency (CLWA) and Metropolitan Water District of Southern California (Metropolitan). Water releases from Castaic Lake occur via pipeline. There are no controlled releases from Castaic Lake to Castaic Creek. DWR does release natural flows entering Castaic Lake to Castaic Lagoon, located below Castaic Lake, directly above Castaic Creek. There are no controlled releases from Castaic Lagoon. Castaic Lagoon serves as a recharge area for the local aquifer. Thus, natural surface flows entering Castaic Lake become subsurface flows after percolating below Castaic Lagoon, except during storm events when water spills from the Lagoon into Castaic Creek.

### **ESTIMATED ECONOMIC IMPACTS**

190 The Service may suggest water releases from Castaic Lagoon to Castaic Creek to support AT breeding. Controlled releases would require capital investments and water replacement. EPS assumes a \$10 million expenditure on capital improvements to allow controlled release at Castaic Lagoon. Over 30 years at 5 percent interest, this expenditure results in an annual payment of approximately \$650,500.

Because DWR currently releases natural flows from Castaic Lake, it is unlikely that DWR will need to replace water provided for AT habitat. It should be noted, however, that natural flows to Castaic Lagoon help support water-based recreation there. Without storage of natural flows, existing contracts guarantee water for recreation on Castaic

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<sup>94</sup> The EPS cost estimate does not include the capital cost of MWD network expansion. Further research is required to determine whether this expansion would be necessary.

<sup>95</sup> Personal communication with Bob Roebuck, General Manager, Montecito Water District, April 16, 2004.

200 Lagoon. Nonetheless, to whatever degree the potential reduction in storage of natural flows at Castaic Lagoon affects recreational pressure or quality of the resource, there are likely to be economic impact not captured by this analysis.

## **BIG TUJUNGA DAM/BIG TUJUNGA CREEK**

### **BACKGROUND**

210 The Los Angeles County Department of Public Works (DPW) manages releases from Big Tujunga Dam to Big Tujunga Creek. Water releases from Big Tujunga Dam flow through Big Tujunga Creek and Hansen Reservoir to spreading areas that recharge the San Fernando Groundwater Basin. The City of Los Angeles pumps water from this basin for municipal and industrial uses. According to DPW, releases from Big Tujunga Dam must be 40 to 60 cfs to reach the spreading areas.

Water releases from Big Tujunga Dam to Big Tujunga Creek are substantial during the AT breeding season. Storms usually provide water through April. Big Tujunga Dam fills throughout the winter and early spring. Releases are necessary to keep the reservoir storage level within safety constraints. Currently, seismic restrictions (a maximum storage constraint) and dam protection measures (a minimum storage constraint) limit dam operations.

220 DPW is currently undertaking initial discussions with the Service regarding proposed modifications to Big Tujunga Dam and future operation and maintenance activities. Thus far, discussions have addressed the Santa Anna Sucker but not the AT. According to the Service, when proposed CH is in place, a conference opinion covering the AT may be issued. A Service biologist states that additional research will be required to understand what flow management guidelines will benefit the Santa Anna Sucker, AT, and other species. The upcoming dam modification project will increase storage capacity and allow for mid-summer releases that benefit the Santa Anna Sucker. According to the Service, the future consultation regarding ongoing operations and maintenance of Big Tujunga Dam is likely to be a formal consultation.

### **ANALYSIS OF FLOWS**

230 EPS estimates upper-bound impacts by assuming that the Service will request curtailment of high volume releases during the AT breeding season, with the exception of releases related to large storm events. According to DPW, this requirement will result in water lost to evaporation from the reservoir. Additionally, infiltration of low volume in-stream flows provided for the AT will result in lost water. EPS also believes losses may occur as a result of lost storage capacity leading to lost water capture, should two wet years occur in succession.

240 The County of Los Angeles provided EPS hourly data on flow measured below Big Tujunga Dam. These data do not distinguish between controlled and uncontrolled releases. Because it is unlikely that the Service will request uncontrolled (large storm event) releases from Big Tujunga, EPS analyzed data from a free-flowing stretch of upper Big Tujunga Creek (USGS 11094500 TUJUNGA C NR COLBY RANCH CA) collected between 1931 and 1949 to identify the proportion of water volume attributable to large storm events during the AT breeding season.

250 First, EPS identifies the flow rate (in cfs) that constitutes a large storm event in Big Tujunga Creek. Knowing that large storm events have been defined by DWR and the Service as 1,000 cfs in Piru Creek, EPS analyzed Upper Piru Creek daily mean streamflow data (USGS 11109375 PIRU C BL BUCK C NR PYRAMID LK CA) to determine the percentage of daily flows considered large storm events. This analysis indicates that over the 15 years of complete data, mean daily flow of 1,000 cfs occurred on 0.5 percent of all days. Applying this percentile to mean daily streamflow in upper Big Tujunga Creek, EPS determines that a flow of 438 cfs would constitute large storm event there. Further analysis shows that over the 19 years of complete data from upper Big Tujunga Creek, large storm events provided approximately 3 percent of total water volumes during the breeding season.

## ESTIMATED ECONOMIC IMPACTS

260 EPS analysis of flow data from below Big Tujunga Dam from 1988 through 1999 reveals an average flow of approximately 35 cfs during the breeding season. This flow yields approximately 6,515 acre feet of water over the 93-day AT breeding season. Given the analysis of the upper Big Tujunga, it is reasonable to assume that 3 percent of the 6,516 acre feet (195 acre feet) would be released during storm events. Thus, EPS analysis indicates that the total expected volume of controlled release during the breeding season is 6,320 acre feet.

270 Due to the complexity of DPW's water management constraints, operational flexibility is not well understood. Because EPS analysis relies on historical dam release data, DPW's management response to the Service guidelines regarding dam operations are not accounted for. To whatever degree DPW is able to adapt to new operational guidelines, loss of the entire volume of water release expected during the AT breeding season will overstate the impacts of the potential future management regulation. To account for varying degrees of operational flexibility, EPS assumes that 50 percent of the expected (controlled) water release volume during the breeding season will require replacement. Thus, EPS estimates that DPW will need to replace 3,160 acre feet on average.

According to DPW, replacement water is available from Metropolitan. DPW has not provided information regarding the cost of replacement water. EPS assumes a cost of \$480 per acre foot based on the range of costs provided by other water managers in Southern California. At this per acre foot cost, the total water replacement cost is estimated to be approximately \$1.5 million per year.



## 280 **CITY OF ESCONDIDO DIVERSION/SAN LUIS REY RIVER**

### BACKGROUND

The City of Escondido and Vista Irrigation District obtain water diverted from the San Luis Rey River. The diversion facility, located approximately seven miles west of Lake Henshaw on the La Jolla Indian Reservation, diverts nearly 100 percent of the San Luis Rey River at that point. The City conveys water by canal from the diversion facility to the Rincon Indian Reservation and Lake Wohlford. The first six cfs of flow is released through the Rincon Power Plant and on to the Rincon Reservation. The remaining water is released to Lake Wohlford, released to the Bear Valley Power Plant, then treated and allocated to both the City of Escondido and the Vista Irrigation District.

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In the future, the Service may request that the City of Escondido provide natural flows below the diversion facility during AT breeding habitat. The true natural flow of the San Luis Rey River at the diversion facility is unknown as releases from Lake Henshaw determine flows. Additionally, no data from a USGS or other gauging station located above Lake Henshaw is available to determine the natural flow of the San Luis Rey River. The City of Escondido does record water volumes at the diversion facility and identifies San Luis Rey River natural flow volumes originating between Lake Henshaw and the diversion facility.

### ESTIMATED ECONOMIC IMPACTS

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According to historical data obtained from the City of Escondido, an average of 3,507 acre feet of natural flow has been recorded at the San Luis Rey diversion facility during the AT breeding seasons (1975 through 2003). This figure suggests that natural flows originating between Lake Henshaw and the City of Escondido diversion facility average almost 20 cfs during the 93 day breeding season. This natural flow is attributable to the approximately 12 tributaries entering the San Luis Rey River over the seven mile stretch between Lake Henshaw and the diversion. Given that 20 cfs is consistent with other natural flow rates in AT habitat and the lack of additional natural flow data, EPS assumes that the Service will advise that the natural flows originating between Lake Henshaw and the City of Escondido diversion facility be allocated to the AT habitat below the diversion.

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Both the City of Escondido and Vista Irrigation District are able to obtain additional water supplies from the San Diego County Water Authority (CWA). According to the City of Escondido, water from CWA costs \$480 per acre foot.<sup>96</sup> Vista Irrigation District reports that CWA water costs them \$439 per acre foot.<sup>97</sup> Because the City of Escondido and Vista Irrigation split the diverted San Luis Rey water evenly, EPS uses the average

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<sup>96</sup> Personal communication with Glen Peterson, Interim Utilities Manager, City of Escondido, April 6, 2004.

<sup>97</sup> Personal communication with Don Smith, Director of Water Resources, Vista Irrigation District, March 23, 2004.

replacement cost of water, approximately \$460 per acre foot. Replacement of 3,507 acre feet of water at \$460 per acre foot results in a total replacement cost of approximately \$1.6 million.

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Allocation of water to AT habitat will also have impacts on the City of Escondido's revenue from hydropower generation. Because the Rincon Power Plant runs on the first six cfs of diverted water, it is unlikely that power generation at this plant will be affected. The majority of losses are likely to occur at the Bear Valley Power Plant. This plant receives water released from Lake Wohlford. In an average year the City of Escondido is likely to lose power generation on the 3,507 acre feet of natural flow allocated to AT habitat in the San Luis Rey River. According to the City, the Bear Valley Power Plant produces \$13 of revenue per acre foot of water.<sup>98</sup> Thus, the cost from the reduction in power generation is expected to be approximately \$46,000, annually.

## 330 **LOVELAND RESERVOIR/SWEETWATER RIVER**

### BACKGROUND

Releases from Loveland Reservoir to the Sweetwater River are managed by the Sweetwater Authority. A recent USGS report prepared for the Sweetwater Authority examines the risk of Loveland Dam Operations to the AT.<sup>99</sup> According to the report, dam releases during the AT breeding season are the biggest concern for AT reproductive success and are therefore the focus of the USGS analysis. Results of the analysis indicate that avoiding controlled releases during the AT breeding season will greatly reduce the risk of loss of AT eggs, larvae and metamorphs and in turn increase AT reproductive success and long term population viability.

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The Sweetwater Authority has managed Loveland Reservoir since 1977. During that time, the Sweetwater Authority has followed the "rule of thumb" that "releases should begin after we have had significant rainfall to saturate the river channel to maximize the volume recovered as Sweetwater." The USGS report:

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*According to this rule, controlled releases will occur during the typically wetter months of the year, November through March, and either in conjunction or immediately after a rain event, thus mimicking the natural flow of the system. ...Since 1977, Sweetwater Authority's management scheme has resulted in fewer controlled releases during the arroyo toad breeding season, with most releases occurring in November through February (67%).*

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<sup>98</sup> Personal communication with Glen Peterson, Interim Utilities Manager, City of Escondido, April 6, 2004.

<sup>99</sup> Madden-Smith et al., *Assessing the Risk of Loveland Dam Operations to the Arroyo Toad (Bufo Californicus) in the Sweetwater River Channel, San Diego County California*, U.S. Department of the Interior, U.S. Geological Survey, 2003.

## ESTIMATED ECONOMIC IMPACTS

The results of analysis conducted by the Sweetwater Authority presented in the appendix of the USGS report estimate the probability of controlled release by month. These probabilities represent the number of times that a release is expected to occur in each month and are based on the historical record of controlled release data since 1977.

360 In addition, the Sweetwater Authority provided EPS data on the mean volume of controlled releases by month. Multiplying the monthly probability of controlled release by the average monthly volume of controlled release yields the expected volume of controlled release. EPS analysis indicates that the total expected volume of controlled release during the breeding season is 1,568 acre feet.

370 Due to the complexity of Sweetwater Authority's water management constraints, operational flexibility is not well understood. Because EPS analysis relies on historical dam release data, Sweetwater Authority's management response to the Service guidelines regarding dam operations are not accounted for. To whatever degree the Sweetwater Authority is able to adapt to new operational guidelines, loss of the entire volume of water release expected during the AT breeding season will overstate the impacts of the potential future management regulation. To account for varying degrees of operational flexibility, EPS assumes that 50 percent of expected (controlled) water release volume during the breeding season will require replacement. Thus, EPS estimates that the Sweetwater Authority will need to replace 784 acre feet on average.

The Sweetwater Authority purchases water from the SWP. This water costs approximately \$500 per acre foot.<sup>100</sup> Replacement of 784 acre feet at this cost results in an expected annual water replacement cost of approximately \$392,000.

## COLORADO RIVER AQUEDUCT/WHITEWATER RIVER

### BACKGROUND

380 The Coachella Valley Water District (CVWD) and Desert Water Agency (DWA) receive water deliveries from the Colorado River Aqueduct via the Whitewater River. According to CVWD and DWA, deliveries tend to occur in March and April. The water from the Colorado River Aqueduct is supplied by Metropolitan. Deliveries are dependent on Metropolitan's water quality requirements. Metropolitan is obligated to meet water quality requirements by mixing SWP and Colorado River water. Metropolitan does not supply water to CVWD or DWA when Colorado River water is needed to meet their quality requirements. Thus, deliveries to CVWD and DWA only occur when surplus water (above Metropolitan's needs) is available, generally during the AT breeding season.

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<sup>100</sup> Personal communication with Michael Garrod, Chief Engineer, Water Resources Department, Sweetwater Authority, April 7, 2004.

## 390 ESTIMATED ECONOMIC IMPACTS

CVWD and DWA use Colorado River Aqueduct water to recharge groundwater that is pumped for municipal and industrial uses. Currently no other source of water is available for this purpose. Thus, additional infrastructure will be needed if conveyance in the Whitewater River is avoided to protect AT. DWA indicates that a pipeline from the Colorado River Aqueduct to the Whitewater River (south of I-10, outside CH, approximately one mile) would allow for avoidance of AT habitat impacts. A rough estimate of the cost of such a pipeline is as follows:<sup>101</sup>

- 400
- 36" elevated steel pipeline: cost \$1000 per foot, installed
  - Engineering/design: costs (10% to 15% of project cost)
  - CEQA/NEPA documentation: cost \$25,000
  - Service consultation: cost unknown
  - Right of way (if necessary): cost unknown

The total cost of the pipeline (without right-of-way or Service consultation costs) is estimated to be \$6.1 million. The annual cost of the project assuming a 30-year payment period and 5 percent interest is approximately \$400,000. According to DWA, the cost of the pipeline would likely be split evenly between DWA and CVWD.<sup>102</sup>

## MORENA RESERVOIR/COTTONWOOD CREEK

### 410 BACKGROUND

Releases from Morena Reservoir are managed by the City of San Diego. Morena Reservoir provides storage for local water. Water releases from Morena Reservoir to Cottonwood Creek travel to Barrett Lake. From there, water is released to Lower Otay Reservoir and then the Otay Treatment Plant. Water is only moved from Morena Reservoir once it has filled to capacity. The City prefers to move water at the end of the rainy season (March) because the ground is saturated and less water is lost to infiltration.

### ANALYSIS OF FLOWS

- 420
- The City of San Diego provided EPS monthly data on Morena Reservoir releases between 1911 and 2004. These data do not distinguish between controlled and uncontrolled releases. Because it is unlikely that the Service will request curtailment of uncontrolled releases from Morena, EPS analyzed data from a free-flowing stretch of the

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<sup>101</sup> Personal communication with Dan Ainsworth, General Manager, Desert Water Agency, April 7, 2004.

<sup>102</sup> Personal communication with Dan Ainsworth, General Manager, Desert Water Agency, April 7, 2004.

nearby Sweetwater River (USGS 11015000 SWEETWATER R NR DESCANSO CA) to estimate the proportion of water volume attributable to large storm events during the AT breeding season.

430 First, EPS identifies the flow rate (in cfs) that constitutes a large storm event in the Sweetwater River. Knowing that large storm events have been defined by DWR and the Service as 1,000 cfs in Piru Creek, EPS analyzed Upper Piru Creek daily mean streamflow data (USGS 11109375 PIRU C BL BUCK C NR PYRAMID LK CA) to determine the percentage of daily flows considered large storm events. This analysis indicates that over the 15 years of complete data, mean daily flow of 1,000 cfs or greater occurred on 0.5 percent of all days. Applying this percentile to mean daily streamflow in the Sweetwater River, EPS determines that flow of 286 cfs would constitute large storm event there. Further analysis shows that over 67 years of complete data from the Sweetwater River (collected between 1906 and 2001), large storm events provided approximately 30 percent of total water volumes during the breeding season.

#### 440 ESTIMATED ECONOMIC IMPACTS

Data from Morena Reservoir indicates that an average of 904 acre feet are released from Morena during the AT breeding season. Given the analysis of the nearby Sweetwater River, it is reasonable to assume that 30 percent of the 904 acre feet (271 acre feet) would be released during storm events. Thus, EPS analysis indicates that the total expected volume of controlled release during the breeding season is 633 acre feet.

450 Due to the complexity of the City's water management constraints, operational flexibility is not well understood. Because EPS analysis relies on historical dam release data, the City's management response to the Service guidelines regarding dam operations are not accounted for. To whatever degree DPW is able to adapt to new operational guidelines, loss of the entire volume of water release expected during the AT breeding season will overstate the impacts of the potential future management regulation. To account for varying degrees of operational flexibility, EPS assumes that 50 percent of the expected water release volume during the breeding season will require replacement. Thus, EPS estimates that the City will need to replace approximately 317 acre feet annually.

460 The City is able to buy water from CWA. According to the City, CWA water costs \$480 per acre foot.<sup>103</sup> Replacement of 317 acre feet at this cost results in an expected annual water replacement cost of approximately \$152,000.

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<sup>103</sup> Personal communication with Kent Floro, Assistant Director of Water Operations, City of San Diego, April 7, 2004

## **EL CAPITAN RESERVOIR/SAN DIEGO RIVER, SAN VICENTE RESERVOIR/SAN VICENTE CREEK, AND LAKE SUTHERLAND/SANTA YSABEL CREEK**

### **BACKGROUND**

470 The El Capitan Reservoir, San Vicente Reservoir and Lake Sutherland are managed by the City of San Diego. The dams at these reservoirs are not designed for controlled releases and only spill water into the river or creek below during large storm events. The Service may pursue dam modifications that enable controlled release from El Capitan Reservoir, San Vicente Reservoir, and Lake Sutherland. Additionally, natural in-stream flows would be required during the AT breeding season. If the Service pursues modifications to El Capitan Reservoir, San Vicente Reservoir and Lake Sutherland along with management changes, costs will include both infrastructure costs and water supply replacement costs.

### **ESTIMATED ECONOMIC IMPACTS**

Natural flow above El Capitan Reservoir, San Vicente Reservoir, and Lake Sutherland are unknown. Thus, EPS uses data on runoff collected at these reservoirs as a proxy for natural flows.<sup>104</sup> EPS assumes that runoff collected during the breeding season will be allocated to AT habitat.

480 EPS analysis of runoff data collected between October 1987 and February 2004 at El Capitan Reservoir, San Vicente Reservoir, and Lake Sutherland indicates that an average of 7,181 acre feet, 2,066 acre feet, and 2,793 acre feet of runoff is collected during AT breeding season at these reservoirs, respectively. These runoff figures do not include water collected at the reservoirs from rain on the surface of the reservoir.

The City of San Diego is able to purchase CWA water for \$480 per acre foot. At this price, the total cost of water replacement is \$3.4 million, \$1.0 million, and \$1.3 million per year at El Capitan Reservoir, San Vicente Reservoir, and Lake Sutherland, respectively.

490 EPS assumes a \$10 million expenditure on capital improvements to allow controlled release at each reservoir. Over 30 years at 5 percent interest, this expenditure results in an annual payment of approximately \$650,500. The total cost of AT protection is estimated to be \$4.1 million, \$1.6 million, and \$2.0 million per year at El Capitan Reservoir, San Vicente Reservoir, and Lake Sutherland, respectively.

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<sup>104</sup> Kent Floro indicates that runoff data is the best available proxy for natural flow data. Personal communication with Kent Floro, Assistant Director of Water Operations, City of San Diego, April 7, 2004,

## **CUYAMACA RESERVOIR/SAN DIEGO RIVER**

### **BACKGROUND**

500 Cuyamaca Reservoir, in San Diego County, is managed by the Helix Water District (HWD). HWD releases water from Cuyamaca Reservoir to Boulder Creek, which flows into the San Diego River above El Capitan Reservoir. Cuyamaca Reservoir provides storage of local water for HWD. HWD releases water from Cuyamaca to El Capitan Reservoir (where they have storage rights for 10,000 acre feet) and then to a distribution network. HWD must release water from Cuyamaca to El Capitan to avoid losses to evaporation.<sup>105</sup>

### **ESTIMATED ECONOMIC IMPACTS**

510 EPS obtained historical data on water releases from Cuyamaca Reservoir from HWD. The data describe annual water quantities released from Cuyamaca Reservoir from 1939 through 2003. Discussion with HWD indicates that HWD releases water during February, March, April, and May in most years. Additionally, HWD states that water releases from Cuyamaca Reservoir occur at a constant rate and, thus, releases are evenly spread out between February and May. Based on this discussion, EPS assumes that 25 percent of HWD releases occur in each month from February through May. Based on this distribution, EPS calculates an average release volume of 1,599 acre feet during the breeding season.

520 To account for varying degrees of operational flexibility, EPS assumes that 50 percent of water volume expected to be released during the breeding season will require replacement. Thus, EPS estimates that the City will need to replace approximately 800 acre feet on average.

Helix is able to replace water with water from CWA. This replacement water is available at \$473 per acre foot.<sup>106</sup> Given replacement of foregone releases at this price, EPS expects that HWD may incur costs attributable to AT protection equal to \$378,000.

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<sup>105</sup> Personal communication with Larry Campbell, Helix Water District, March 24, 2004.

<sup>106</sup> Ibid.



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## APPENDIX D:

### REGIONAL ECONOMIC EFFECTS TO WATER SUPPLY



**Appendix D-1**  
**Household Spending Multiplier Calculation**  
**Economic Analysis of Critical Habitat Designation for the Arroyo Toad**

Description	Water	Percentage	Cost Allocation	Multiplier	
	Consumption (\$Thousands)			Employment	Output
SAN DIEGO COUNTY			\$1,000,000		
Households LT10k	\$12,335	4.36%	\$43,576	0.50	\$60,342
Households 10-15k	\$10,586	3.74%	\$37,398	0.40	\$51,888
Households 15-25k	\$23,610	8.34%	\$83,408	0.90	\$115,215
Households 25-35k	\$26,623	9.41%	\$94,052	1.00	\$130,465
Households 35-50k	\$40,904	14.45%	\$144,503	1.60	\$200,447
Households 50-75k	\$59,023	20.85%	\$208,513	2.30	\$289,290
Households 75-100k	\$39,843	14.08%	\$140,755	1.60	\$196,082
Households 100-150k	\$40,819	14.42%	\$144,203	1.60	\$200,885
Households 150k+	\$29,323	10.36%	\$103,591	1.20	\$144,309
Total Households	\$283,066	100.00%	\$1,000,000	11.10	\$1,388,923
SANTA BARBARA COUNTY					
Households LT10k	\$1,839	4.68%	\$46,767	0.50	\$62,854
Households 10-15k	\$1,557	3.96%	\$39,595	0.40	\$53,254
Households 15-25k	\$3,140	7.99%	\$79,851	0.90	\$107,020
Households 25-35k	\$3,729	9.48%	\$94,830	1.00	\$127,350
Households 35-50k	\$5,628	14.31%	\$143,122	1.60	\$192,037
Households 50-75k	\$7,887	20.06%	\$200,570	2.20	\$269,026
Households 75-100k	\$5,556	14.13%	\$141,291	1.60	\$189,773
Households 100-150k	\$5,453	13.87%	\$138,672	1.60	\$186,256
Households 150k+	\$4,534	11.53%	\$115,301	1.30	\$154,865
Total Households	\$39,323	100.00%	\$1,000,000	11.10	\$1,342,435
LOS ANGELES COUNTY					
Households LT10k	\$58,215	6.53%	\$65,307	0.70	\$96,887
Households 10-15k	\$41,784	4.69%	\$46,875	0.50	\$69,736
Households 15-25k	\$81,822	9.18%	\$91,790	1.00	\$135,809
Households 25-35k	\$84,916	9.53%	\$95,261	1.10	\$141,129
Households 35-50k	\$123,894	13.90%	\$138,988	1.50	\$205,527
Households 50-75k	\$168,479	18.90%	\$189,005	2.10	\$279,765
Households 75-100k	\$113,163	12.69%	\$126,950	1.50	\$188,786
Households 100-150k	\$118,278	13.27%	\$132,688	1.50	\$197,319
Households 150k+	\$100,850	11.31%	\$113,137	1.30	\$168,245
Total Households	\$891,401	100.00%	\$1,000,000	11.20	\$1,483,203
VENTURA COUNTY					
Households LT10k	\$1,802	2.75%	\$27,492	0.30	\$36,034
Households 10-15k	\$1,646	2.51%	\$25,112	0.30	\$32,934
Households 15-25k	\$3,616	5.52%	\$55,167	0.60	\$72,102
Households 25-35k	\$4,380	6.68%	\$66,823	0.70	\$87,538
Households 35-50k	\$7,866	12.00%	\$120,007	1.30	\$157,162
Households 50-75k	\$13,317	20.32%	\$203,170	2.20	\$265,777
Households 75-100k	\$11,112	16.95%	\$169,530	1.90	\$222,248
Households 100-150k	\$12,645	19.29%	\$192,918	2.10	\$252,909
Households 150k+	\$9,162	13.98%	\$139,780	1.50	\$183,247
Total Households	\$65,546	100.00%	\$1,000,000	10.90	\$1,309,951
RIVERSIDE COUNTY					
Households LT10k	\$6,886	5.36%	\$53,620	0.60	\$69,148
Households 10-15k	\$5,958	4.64%	\$46,394	0.50	\$59,764
Households 15-25k	\$12,524	9.75%	\$97,521	1.00	\$125,625
Households 25-35k	\$12,650	9.85%	\$98,503	1.10	\$126,759
Households 35-50k	\$19,609	15.27%	\$152,691	1.60	\$195,900
Households 50-75k	\$27,495	21.41%	\$214,097	2.30	\$274,580
Households 75-100k	\$18,003	14.02%	\$140,185	1.50	\$180,376
Households 100-150k	\$16,194	12.61%	\$126,099	1.40	\$162,251
Households 150k+	\$9,104	7.09%	\$70,891	0.80	\$91,215
Total Households	\$128,423	100.00%	\$1,000,000	10.80	\$1,285,618

Appendix D-2  
Water Supply and Demand by County [1]  
Economic Analysis of Critical Habitat Designation for the Arroyo Toad

Description	Amount (\$thousands)	Percentage w/ Trade	Percentage w/out Trade
<b>SAN DIEGO COUNTY</b>			
<b>Total Supply</b>	<b>\$533,500</b>		
Demand:			
Households	\$283,066	53.06%	68.27%
Retail	\$5,837	1.09%	1.41%
State/Local Government	\$26,417	4.95%	6.37%
Agriculture	\$3,009	0.56%	0.73%
All Other Sectors	\$96,316	18.05%	23.23%
Trade	\$118,855	22.28%	0.00%
<b>Total Demand</b>	<b>\$533,500</b>	<b>100.00%</b>	<b>100.00%</b>
<b>SANTA BARBARA COUNTY</b>			
<b>Total Supply</b>	<b>\$66,318</b>		
Demand:			
Households	\$39,323	59.29%	24.78%
Retail	\$823	1.24%	0.52%
State/Local Government	\$4,750	7.16%	2.99%
Agriculture	\$5,115	7.71%	3.22%
All Other Sectors	\$108,648	163.83%	68.48%
Trade	(\$92,341)	-139.24%	0.00%
<b>Total Demand</b>	<b>\$66,318</b>	<b>100.00%</b>	<b>100.00%</b>
<b>LOS ANGELES COUNTY</b>			
<b>Total Supply</b>	<b>\$2,154,837</b>		
Demand:			
Households	\$891,401	41.37%	64.01%
Retail	\$17,620	0.82%	1.27%
State/Local Government	\$91,761	4.26%	6.59%
Agriculture	\$1,401	0.07%	0.10%
All Other Sectors	\$390,415	18.12%	28.04%
Trade	\$762,239	35.37%	0.00%
<b>Total Demand</b>	<b>\$2,154,837</b>	<b>100.00%</b>	<b>100.00%</b>
<b>VENTURA COUNTY</b>			
<b>Total Supply</b>	<b>\$85,951</b>		
Demand:			
Households	\$65,546	76.26%	66.42%
Retail	\$1,469	1.71%	1.49%
State/Local Government	\$5,448	6.34%	5.52%
Agriculture	\$6,896	8.02%	6.99%
All Other Sectors	\$19,318	22.48%	19.58%
Trade	(\$12,726)	-14.81%	0.00%
<b>Total Demand</b>	<b>\$85,951</b>	<b>100.00%</b>	<b>100.00%</b>
<b>RIVERSIDE COUNTY</b>			
<b>Total Supply</b>	<b>\$289,000</b>		
Demand:			
Households	\$128,423	44.44%	67.38%
Retail	\$2,686	0.93%	1.41%
State/Local Government	\$15,723	5.44%	8.25%
Agriculture	\$5,456	1.89%	2.86%
All Other Sectors	\$38,294	13.25%	20.09%
Trade	\$98,418	34.05%	0.00%
<b>Total Demand</b>	<b>\$289,000</b>	<b>100.00%</b>	<b>100.00%</b>

Source: Minnesota IMPLAN Group, Inc.

[1] Based on Commodity Sector 32 (Water, sewage, and other systems) in IMPLAN model.



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## APPENDIX E:

## DELAY COSTS

**Table E-1**  
**Delay Costs in Critical Habitat**  
**Economic Analysis of Critical Habitat Designation for the Arroyo Toad**

CH Unit	County	Development Occurring in Critical Habitat (Acres) [1]				
		Residential	Office	Retail	Industrial	Total
1	Monterey	--	--	--	--	--
2	Santa Barbara	1.2	--	--	--	1.2
3	Santa Barbara	0.0	--	--	--	0.0
4	Ventura	0.0	0.0	0.0	0.0	0.0
5	Los Angeles	0.4	0.8	0.2	0.5	2.0
	<u>Ventura</u>	0.0	0.0	0.0	0.0	0.0
	Unit Total	0.5	0.8	0.2	0.5	2.0
6	Los Angeles	17.1	28.3	7.6	16.7	69.7
7	Los Angeles	17.4	50.9	13.6	30.1	112.1
8	Orange	1.1	4.3	1.4	2.9	9.7
9	Riverside	0.0	0.0	0.0	0.0	0.0
10	Orange	37.4	123.2	39.0	82.6	282.1
	<u>Riverside</u>	0.0	0.0	0.0	0.0	0.0
	Unit Total	37.4	123.2	39.0	82.6	282.1
11	Orange	6.9	37.2	11.7	24.8	80.6
	<u>San Diego</u>	0.0	0.0	0.0	0.0	0.0
	Unit Total	6.9	37.2	11.7	24.8	80.6
12	San Diego	195.5	0.0	0.3	0.2	196.0
13	Riverside	0.3	1.3	0.5	0.8	2.8
	<u>San Diego</u>	162.4	0.0	0.0	0.0	162.5
	Unit Total	162.7	1.3	0.5	0.8	165.3
14	San Diego	647.6	0.0	7.2	1.9	656.7
15	San Diego	392.9	0.0	0.1	0.0	393.0
16	San Diego	826.3	0.0	1.0	1.2	828.6
17	San Diego	198.7	0.0	0.5	0.9	200.1
18	San Diego	463.1	0.1	1.2	1.2	465.6
19	San Diego	992.6	0.0	2.7	0.3	995.5
20	San Diego	5.6	6.5	2.4	4.3	18.8
21	Los Angeles	0.0	0.0	0.0	0.0	0.0
22	San Bernardino	37.7	63.1	23.7	42.1	166.7
23	Riverside	4.2	6.0	2.3	3.6	16.2
<b>Total</b>		<b>4,008</b>	<b>322</b>	<b>116</b>	<b>214</b>	<b>4,660</b>

(1) See Table B-1 for detail regarding development occurring in CH.

Table E-1 continued  
Delay Costs in Critical Habitat  
Draft Economic Analysis of Critical Habitat Designation for the Arroyo Toad

CH Unit	Developable Acres Delayed (2)				
	Residential	Office	Retail	Industrial	Total
1	--	--	--	--	--
2	0.1	--	--	--	0.1
3	0.0	--	--	--	0.0
4	0.0	0.0	0.0	0.0	0.0
5	0.0	0.0	0.0	0.0	0.1
	<u>0.0</u>	<u>0.0</u>	<u>0.0</u>	<u>0.0</u>	<u>0.0</u>
	0.0	0.0	0.0	0.0	0.1
6	0.8	1.3	0.4	0.8	3.3
7	0.8	2.4	0.6	1.4	5.3
8	0.1	0.2	0.1	0.1	0.5
9	0.0	0.0	0.0	0.0	0.0
10	1.8	5.9	1.9	3.9	13.4
	<u>0.0</u>	<u>0.0</u>	<u>0.0</u>	<u>0.0</u>	<u>0.0</u>
	1.8	5.9	1.9	3.9	13.4
11	0.3	1.8	0.6	1.2	3.8
	<u>0.0</u>	<u>0.0</u>	<u>0.0</u>	<u>0.0</u>	<u>0.0</u>
	0.3	1.8	0.6	1.2	3.8
12	9.3	0.0	0.0	0.0	9.3
13	0.0	0.1	0.0	0.0	0.1
	<u>7.7</u>	<u>0.0</u>	<u>0.0</u>	<u>0.0</u>	<u>7.7</u>
	7.7	0.1	0.0	0.0	7.9
14	30.8	0.0	0.3	0.1	31.3
15	18.7	0.0	0.0	0.0	18.7
16	39.3	0.0	0.0	0.1	39.5
17	9.5	0.0	0.0	0.0	9.5
18	22.1	0.0	0.1	0.1	22.2
19	47.3	0.0	0.1	0.0	47.4
20	0.3	0.3	0.1	0.2	0.9
21	0.0	0.0	0.0	0.0	0.0
22	1.8	3.0	1.1	2.0	7.9
23	0.2	0.3	0.1	0.2	0.8
<b>Total</b>	<b>191</b>	<b>15</b>	<b>6</b>	<b>10</b>	<b>222</b>

(2) The amount of development projected to occur in Year 1, assuming even distribution through 2025.

Table E-1 continued  
Delay Costs in Critical Habitat  
Draft Economic Analysis of Critical Habitat Designation for the Arroyo Toad

CH Unit	Present Value Loss from Delay (3)				
	Residential	Office	Retail	Industrial	Total
1	--	--	--	--	--
2	\$175	--	--	--	\$175
3	\$1	--	--	--	\$1
4	\$7	\$0	\$0	\$0	\$7
5	\$81	\$226	\$82	\$19	\$408
	<u>\$7</u>	<u>\$0</u>	<u>\$0</u>	<u>\$0</u>	<u>\$7</u>
	\$89	\$226	\$82	\$19	\$415
6	\$3,151	\$7,844	\$2,842	\$662	\$14,499
7	\$3,215	\$14,119	\$5,116	\$1,192	\$23,641
8	\$254	\$1,117	\$552	\$130	\$2,053
9	\$0	\$1	\$0	\$0	\$1
10	\$8,533	\$31,862	\$15,777	\$3,725	\$59,898
	<u>\$0</u>	<u>\$0</u>	<u>\$0</u>	<u>\$0</u>	<u>\$0</u>
	\$8,533	\$31,862	\$15,777	\$3,725	\$59,898
11	\$1,584	\$9,611	\$4,755	\$1,119	\$17,069
	<u>\$0</u>	<u>\$0</u>	<u>\$0</u>	<u>\$0</u>	<u>\$0</u>
	\$1,584	\$9,611	\$4,755	\$1,119	\$17,069
12	\$34,513	\$0	\$86	\$6	\$34,604
13	\$42	\$272	\$127	\$22	\$462
	<u>\$28,678</u>	<u>\$0</u>	<u>\$9</u>	<u>\$0</u>	<u>\$28,687</u>
	\$28,719	\$272	\$136	\$22	\$29,149
14	\$114,340	\$1	\$1,882	\$55	\$116,278
15	\$69,370	\$0	\$22	\$0	\$69,392
16	\$145,906	\$0	\$264	\$36	\$146,205
17	\$35,083	\$0	\$135	\$26	\$35,244
18	\$81,768	\$13	\$320	\$35	\$82,136
19	\$175,256	\$0	\$700	\$8	\$175,964
20	\$984	\$1,405	\$638	\$125	\$3,152
21	\$0	\$0	\$0	\$0	\$0
22	\$4,052	\$13,667	\$6,205	\$1,212	\$25,136
23	\$538	\$1,307	\$610	\$105	\$2,560
<b>Total</b>	<b>\$707,538</b>	<b>\$81,445</b>	<b>\$40,122</b>	<b>\$8,475</b>	<b>\$837,580</b>

(3) Assumes a 6 month delay using a 3.5% discount rate.

**Table E-2**  
**Delay Costs in Excluded Essential Habitat**  
**Economic Analysis of Critical Habitat Designation for the Arroyo Toad**

EH Unit	County	Development Occurring in Excluded Essential Habitat (Acres) [1]				
		Residential	Office	Retail	Industrial	Total
1	Monterey	0.0	0.0	0.0	0.0	0.0
6	Los Angeles	177.6	59.6	15.9	35.1	288.3
8	Orange	6.1	23.7	7.5	15.8	53.2
9	Riverside	54.7	84.0	32.4	50.6	221.7
10	Orange	0.0	0.0	0.0	0.0	0.0
11	Orange	0.0	0.0	0.0	0.0	0.1
	San Diego	0.0	0.0	0.0	0.0	0.0
	Unit Total	0.0	0.0	0.0	0.0	0.1
12	San Diego	0.1	0.0	0.0	0.0	0.1
13	Riverside	54.2	198.0	76.3	119.2	447.8
14	San Diego	0.2	0.0	0.0	0.0	0.2
16	San Diego	321.9	0.0	4.5	0.4	326.8
17	San Diego	486.8	0.0	1.0	8.2	496.0
18	San Diego	142.7	0.0	0.1	0.2	143.0
19	San Diego	269.0	0.0	0.3	0.3	269.6
22	San Bernardino	31.6	62.0	23.3	41.4	158.3
<b>Total</b>		<b>1,545</b>	<b>427</b>	<b>161</b>	<b>271</b>	<b>2,405</b>

(1) See Table B-2 for detail regarding development occurring in EH.

**Table E-2 continued**  
**Delay Costs in Excluded Essential Habitat**  
**Draft Economic Analysis of Critical Habitat Designation for the Arroyo Toad**

EH Unit	Developable Acres Delayed (2)				
	Residential	Office	Retail	Industrial	Total
1	0.0	0.0	0.0	0.0	0.0
6	8.5	2.8	0.8	1.7	13.7
8	0.3	1.1	0.4	0.8	2.5
9	2.6	4.0	1.5	2.4	10.6
10	0.0	0.0	0.0	0.0	0.0
11	0.0	0.0	0.0	0.0	0.0
	<u>0.0</u>	<u>0.0</u>	<u>0.0</u>	<u>0.0</u>	<u>0.0</u>
	0.0	0.0	0.0	0.0	0.0
12	0.0	0.0	0.0	0.0	0.0
13	2.6	9.4	3.6	5.7	21.3
14	0.0	0.0	0.0	0.0	0.0
16	15.3	0.0	0.2	0.0	15.6
17	23.2	0.0	0.0	0.4	23.6
18	6.8	0.0	0.0	0.0	6.8
19	12.8	0.0	0.0	0.0	12.8
22	1.5	3.0	1.1	2.0	7.5
<b>Total</b>	<b>74</b>	<b>20</b>	<b>8</b>	<b>13</b>	<b>115</b>

(2) The amount of development projected to occur in Year 1, assuming even distribution through 2025.



**Table E-2 continued**  
**Delay Costs in Excluded Essential Habitat**  
**Draft Economic Analysis of Critical Habitat Designation for the Arroyo Toad**

EH Unit	Present Value Loss from Delay (3)				
	Residential	Office	Retail	Industrial	Total
1	\$0	\$0	\$0	\$0	\$0
6	\$36,539	\$16,508	\$5,982	\$1,394	\$60,422
8	\$932	\$6,138	\$3,037	\$714	\$10,822
9	\$6,470	\$18,191	\$8,485	\$1,456	\$34,602
10	\$0	\$0	\$0	\$0	\$0
11	\$1	\$9	\$5	\$1	\$16
	\$0	\$0	\$0	\$0	\$0
	\$1	\$9	\$5	\$1	\$16
12	\$32	\$0	\$0	\$0	\$32
13	\$6,418	\$42,851	\$19,988	\$3,431	\$72,687
14	\$45	\$0	\$0	\$0	\$45
16	\$73,626	\$0	\$1,607	\$25	\$75,258
17	\$111,334	\$0	\$357	\$585	\$112,276
18	\$32,638	\$0	\$30	\$11	\$32,679
19	\$61,518	\$0	\$111	\$24	\$61,654
22	\$3,796	\$13,418	\$6,092	\$1,190	\$24,496
<b>Total</b>	<b>\$333,349</b>	<b>\$97,116</b>	<b>\$45,694</b>	<b>\$8,832</b>	<b>\$484,990</b>

(3) Assumes a 6 month delay using a 3.5% discount rate.



**Economic &  
Planning Systems**

*Real Estate Economics*

*Regional Economics*

*Public Finance*

*Land Use Policy*

# APPENDIX F:

## ADMINISTRATIVE COSTS

**Table F-1**  
**Historical Biological Opinions by Action Type and Associated Cost**  
**Economic Analysis of Critical Habitat Designation for the Arroyo Toad**

Action Category	Historical Formal Consultations (1)		Historical Informal Consultation Cost (3)	Total Historical Consultation Cost
	Biological Opinions	Estimated Cost (2)		
Bank Stabilization	3	\$171,077	\$28,163	\$199,239
Border Patrol	1	\$50,211	\$9,388	\$59,599
Communications	2	\$111,213	\$18,775	\$129,988
Development (Commercial)	3	\$151,309	\$28,163	\$179,472
Development (Residential)	2	\$97,583	\$18,775	\$116,358
Exotic Species Removal	3	\$168,653	\$26,363	\$195,015
Flood Control	4	\$269,468	\$37,550	\$307,018
Forest Fire Management	1	\$63,489	\$8,788	\$72,276
Grazing	4	\$266,832	\$35,150	\$301,982
HCPs	7	\$429,136	\$61,513	\$490,648
Major Roads	14	\$822,548	\$131,425	\$953,973
Mining	5	\$290,283	\$46,938	\$337,221
Pipelines	2	\$129,080	\$18,775	\$147,855
Power	2	\$117,351	\$18,775	\$136,126
Programmatic	3	\$139,397	\$26,363	\$165,760
Recreation	1	\$42,305	\$8,788	\$51,093
Research	2	\$124,514	\$17,575	\$142,089
USFS & Other Minor Roads	11	\$671,085	\$103,263	\$774,348
Water Operations	1	\$70,424	\$9,388	\$79,812
Water Supply Infrastructure	7	\$397,188	\$65,713	\$462,901
<b>Total</b>	<b>78</b>	<b>\$4,583,146</b>	<b>\$719,625</b>	<b>\$5,302,771</b>

(1) Excludes military activities and BO amendments.

(2) Historical costs based on IEC consultation cost estimates, discounted at 7%, and presented in present value terms.

(3) The number of Informal consultations is based on a ratio of one informal consultation to every formal consultation.

**Table F-2**  
**Count of Historical Formal Biological Opinions by CH Unit (1)**  
**Economic Analysis of Critical Habitat Designation for the Arroyo Toad**

CH Unit	Bank Stabilization	Border Patrol	Communications	Development (Commercial)	Development (Residential)	Exotic Species Removal	Flood Control	Forest Fire Management	Grazing	HCPs
1	0	0	0	0	0	0	0	0	0	0
2	0	0	0	0	0	0	0	0	0	0
3	0	0	0	0	0	1	0	0	0	0
4	0	0	0	0	0	1	0	0	0	0
5	0	0	0	0	0	0	0	0	0	0
6	1	0	0	1	0	0	2	0	0	0
7	0	0	0	0	0	0	0	0	0	0
8	0	0	0	0	0	0	0	0	0	0
9	0	0	0	0	0	0	0	0	1	0
10	1	0	0	0	0	0	0	0	0	0
11	1	0	0	0	0	0	0	0	0	0
12	0	0	0	0	0	0	0	0	0	0
13	0	0	0	0	0	0	0	0	0	0
14	0	0	0	2	1	0	1	0	0	0
15	0	0	0	0	0	0	0	0	0	0
16	0	0	0	0	0	1	0	0	0	0
17	0	0	0	0	0	0	0	0	0	0
18	0	0	0	0	0	0	0	0	0	0
19	0	1	0	0	0	0	0	0	2	0
20	0	0	0	0	0	0	0	0	0	0
21	0	0	0	0	0	0	0	0	0	0
22	0	0	0	0	1	0	0	0	1	0
23	0	0	0	0	0	0	0	0	0	0
Programmatics, HCPs, and other multi-unit consultations	0	0	2	0	0	0	1	1	0	7
<b>Total</b>	<b>3</b>	<b>1</b>	<b>2</b>	<b>3</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>1</b>	<b>4</b>	<b>7</b>

(1) Excludes military activities and amendments.

Table F-2 Continued  
Count of Historical Formal Biological Opinions by CH Unit  
Draft Economic Analysis of Critical Habitat Designation for the Arroyo Toad

CH Unit	Major Roads	Mining	Pipelines	Power	Programmatic	Recreation	Research	USFS & Other Minor Roads	Water Operations	Water Supply Infrastructure	Total
1	0	0	0	0	0	0	0	0	0	0	0
2	0	2	0	0	0	0	0	0	0	0	2
3	0	0	0	0	0	0	1	0	0	0	2
4	2	0	0	0	0	0	0	0	1	0	4
5	0	0	0	0	0	0	0	3	0	1	4
6	1	1	0	1	0	0	0	1	0	1	9
7	0	0	0	0	0	0	0	0	0	0	0
8	0	0	0	0	0	0	0	0	0	0	0
9	0	0	0	0	0	0	0	0	0	0	1
10	3	0	1	0	0	0	0	1	0	1	7
11	1	0	0	0	0	0	0	0	0	0	2
12	0	0	0	0	0	0	0	0	0	0	0
13	0	0	0	0	0	0	0	0	0	0	0
14	6	0	1	1	0	0	0	0	0	2	14
15	0	1	0	0	0	0	0	3	0	0	4
16	0	0	0	0	0	0	0	0	0	0	1
17	0	0	0	0	0	0	0	0	0	1	1
18	0	1	0	0	0	0	0	0	0	1	2
19	0	0	0	0	0	1	0	1	0	0	5
20	0	0	0	0	0	0	0	0	0	0	0
21	0	0	0	0	0	0	0	1	0	0	1
22	1	0	0	0	0	0	0	0	0	0	3
23	0	0	0	0	0	0	0	0	0	0	0
Programmatics, HCPs, and other multi- unit consultations	0	0	0	0	3	0	1	1	0	0	16
<b>Total</b>	<b>14</b>	<b>5</b>	<b>2</b>	<b>2</b>	<b>3</b>	<b>1</b>	<b>2</b>	<b>11</b>	<b>1</b>	<b>7</b>	<b>78</b>

**Table F-3**  
**Cost of Historical Formal Biological Opinions by CH Unit (1)**  
**Draft Economic Analysis of Critical Habitat Designation for the Arroyo Toad**

CH Unit	Bank Stabilization	Border Patrol	Communications	Development (Commercial)	Development (Residential)	Exotic Species Removal	Flood Control	Forest Fire Management	Grazing	HCPs
1		\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
2		\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
3		\$0	\$0	\$0	\$0	\$0	\$67,933	\$0	\$0	\$0
4		\$0	\$0	\$0	\$0	\$0	\$55,453	\$0	\$0	\$0
5		\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
6	\$46,927	\$0	\$0	\$43,857	\$0	\$0	\$146,446	\$0	\$0	\$0
7	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
8	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
9	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$48,435	\$0
10	\$70,424	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
11	\$53,726	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
12	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
13	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
14	\$0	\$0	\$0	\$107,453	\$53,726	\$0	\$61,511	\$0	\$0	\$0
15	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
16	\$0	\$0	\$0	\$0	\$0	\$0	\$45,266	\$0	\$0	\$0
17	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
18	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
19	\$0	\$50,211	\$0	\$0	\$0	\$0	\$0	\$0	\$150,464	\$0
20	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
21	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
22	\$0	\$0	\$0	\$0	\$43,857	\$0	\$0	\$0	\$67,933	\$0
23	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
Programmatics, HCPs, and other multi-unit consultations	\$0	\$0	\$111,213	\$0	\$0	\$0	\$61,511	\$63,489	\$0	\$429,136
<b>Total</b>	<b>\$171,077</b>	<b>\$50,211</b>	<b>\$111,213</b>	<b>\$151,309</b>	<b>\$97,583</b>	<b>\$168,653</b>	<b>\$269,468</b>	<b>\$63,489</b>	<b>\$266,832</b>	<b>\$429,136</b>

(1) Historical costs based on IEC consultation cost estimates, discounted at 7%, and presented in present value terms.

Table F-3 Continued  
Cost of Historical Formal Biological Opinions by CH Unit  
Draft Economic Analysis of Critical Habitat Designation for the Arroyo Toad

CH Unit	Major Roads	Mining	Pipelines	Power	Programmatic	Recreation	Research	USFS & Other Minor Roads	Water Operations	Water Supply Infrastructure	Total
1	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
2	\$0	\$108,438	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$108,438
3	\$0	\$0	\$0	\$0	\$0	\$0	\$51,826	\$0	\$0	\$0	\$119,758
4	\$131,935	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$70,424	\$0	\$257,813
5	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$197,634	\$0	\$61,511	\$259,145
6	\$46,927	\$50,211	\$0	\$70,424	\$0	\$0	\$0	\$61,511	\$0	\$61,511	\$527,813
7	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
8	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
9	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$48,435
10	\$183,168	\$0	\$53,726	\$0	\$0	\$0	\$0	\$46,927	\$0	\$43,857	\$398,101
11	\$46,927	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$100,653
12	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
13	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
14	\$369,735	\$0	\$75,354	\$46,927	\$0	\$0	\$0	\$0	\$0	\$94,068	\$808,773
15	\$0	\$65,817	\$0	\$0	\$0	\$0	\$0	\$162,955	\$0	\$0	\$228,772
16	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$45,266
17	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$65,817	\$65,817
18	\$0	\$65,817	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$70,424	\$136,241
19	\$0	\$0	\$0	\$0	\$0	\$42,305	\$0	\$70,424	\$0	\$0	\$313,405
20	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
21	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$65,817	\$0	\$0	\$65,817
22	\$43,857	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$155,646
23	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
Programmatics, HCPs, and other multi-unit consultations	\$0	\$0	\$0	\$0	\$139,397	\$0	\$72,688	\$65,817	\$0	\$0	\$943,251
<b>Total</b>	<b>\$822,548</b>	<b>\$290,283</b>	<b>\$129,080</b>	<b>\$117,351</b>	<b>\$139,397</b>	<b>\$42,305</b>	<b>\$124,514</b>	<b>\$671,085</b>	<b>\$70,424</b>	<b>\$397,188</b>	<b>\$4,583,146</b>

**Table F-4**  
**Count of Future Formal Consultations**  
**Economic Analysis of Critical Habitat Designation for the Arroyo Toad**

CH/EH Unit	<u>Development</u>		<u>Water</u>		<u>Roads</u>		<u>Grazing</u>		<u>Mining</u>		<u>Infrastructure</u>		<u>Other (1)</u>		<u>Total</u>
	CH	EH	CH	EH	CH	EH	CH	EH	CH	EH	CH	EH	CH	EH	
1	--	0.0	0.0	0.0	0.0	0.0	0	0	0	0	0	0	2	0	2
2	2.17	--	0.0	0.0	0.0	0.0	2	2	0	0	2	0	0	0	8
3	0.0	--	0.5	0.0	0.0	0.0	0	0	0	0	2	0	0	0	3
4	0.0	--	0.0	0.0	0.0	0.0	0	0	0	0	2	0	0	0	2
5	0.7	--	0.5	0.0	0.1	0.0	3	0	1	0	2	0	0	0	7
6	24.2	100.0	0.0	0.5	0.2	0.2	0	2	1	1	2	0	0	0	132
7	38.9	--	0.5	0.0	0.1	0.0	0	0	1	0	2	0	0	0	42
8	1.1	6.1	0.0	0.0	0.0	0.1	0	0	0	0	2	0	0	0	10
9	0.0	12.8	0.0	0.0	0.0	0.2	1	0	0	2	2	0	0	0	18
10	32.4	0.0	0.0	0.0	0.5	0.0	0	0	5	0	2	0	0	0	39
11	9.3	0.0	0.0	0.0	0.1	0.1	0	0	1	1	1	1	1	1	13
12	10.8	0.0	0.0	0.0	0.1	0.1	0	0	1	1	2	0	0	0	14
13	9.1	25.8	0.0	0.0	0.4	0.2	0	2	3	2	2	0	0	0	45
14	36.1	0.0	0.5	0.0	0.5	0.2	0	2	4	2	2	0	0	0	47
15	21.6	--	0.0	0.0	0.2	0.0	1	0	2	0	2	0	0	0	26
16	45.5	17.9	0.5	0.0	0.5	0.4	1	0	4	4	2	0	0	0	75
17	11.0	27.2	1.5	0.0	0.4	0.3	3	0	4	2	2	0	0	0	52
18	25.6	7.8	0.5	0.0	0.5	0.1	0	2	4	1	2	0	0	0	44
19	54.7	14.8	0.5	0.0	0.8	0.7	8	0	6	6	2	0	0	0	94
20	2.6	--	0.0	0.0	0.2	0.0	0	0	2	0	2	0	0	0	6
21	0.0	--	0.0	0.0	0.1	0.0	0	0	1	0	2	0	0	0	3
22	23.0	21.8	0.0	0.0	0.4	0.1	1	0	1	1	2	0	0	0	50
23	0.9	--	0.5	0.0	0.1	0.0	0	0	1	0	2	0	0	0	4
<b>Total</b>	<b>349</b>	<b>234</b>	<b>6</b>	<b>1</b>	<b>5.0</b>	<b>2.7</b>	<b>20</b>	<b>10</b>	<b>40</b>	<b>22</b>	<b>43</b>	<b>3</b>			<b>735</b>

(1) Other consultations include military consultations, programmatic consultations, and HCP consultations.



**Table F-5**  
**Cost of Future Formal and Informal Consultations (1,2)**  
**Economic Analysis of Critical Habitat Designation for the Arroyo Toad**

CH/EH Unit	<u>Development</u>		<u>Water</u>		<u>Roads</u>		<u>Grazing</u>		<u>Mining</u>	<u>Infrastructure</u>		<u>Other</u>	<u>Total</u>
	CH	EH	CH	EH	CH	EH	CH	EH	CH	EH	CH	EH	
1	\$0	\$9	\$0	\$0	\$0	\$30	\$0	\$0	\$0	\$306	\$0	\$49,869	\$50,214
2	\$45,975	\$0	\$0	\$0	\$159	\$0	\$46,257	\$51,985	\$1,609	\$0	\$49,869	\$0	\$195,854
3	\$386	\$0	\$12,996	\$0	\$73	\$0	\$0	\$0	\$733	\$0	\$49,869	\$0	\$64,057
4	\$172	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$16	\$0	\$49,869	\$0	\$50,057
5	\$14,488	\$0	\$12,996	\$0	\$2,435	\$0	\$69,386	\$0	\$15,816	\$0	\$49,869	\$0	\$164,990
6	\$510,803	\$2,113,858	\$0	\$12,996	\$4,354	\$4,564	\$0	\$51,985	\$36,889	\$36,110	\$49,869	\$0	\$2,821,429
7	\$821,753	\$0	\$12,996	\$0	\$2,239	\$0	\$0	\$0	\$18,966	\$0	\$49,869	\$0	\$905,823
8	\$23,471	\$129,068	\$0	\$0	\$689	\$3,109	\$0	\$0	\$5,835	\$5,835	\$49,869	\$0	\$217,875
9	\$8	\$270,350	\$0	\$0	\$229	\$4,941	\$23,129	\$0	\$646	\$41,536	\$49,869	\$0	\$390,708
10	\$684,403	\$0	\$0	\$0	\$12,395	\$41	\$0	\$0	\$117,381	\$346	\$49,869	\$0	\$864,436
11	\$195,647	\$190	\$0	\$0	\$2,388	\$2,171	\$0	\$0	\$22,832	\$18,389	\$24,935	\$24,935	\$291,486
12	\$227,606	\$163	\$0	\$0	\$1,721	\$1,557	\$0	\$0	\$14,578	\$13,186	\$49,869	\$0	\$308,681
13	\$192,090	\$545,968	\$0	\$0	\$10,253	\$5,478	\$0	\$51,985	\$86,862	\$46,081	\$49,869	\$0	\$988,587
14	\$762,593	\$227	\$12,996	\$0	\$12,164	\$4,776	\$0	\$51,985	\$102,019	\$40,462	\$49,869	\$0	\$1,037,091
15	\$456,344	\$0	\$0	\$0	\$4,968	\$0	\$23,129	\$0	\$42,084	\$0	\$49,869	\$0	\$576,394
16	\$962,234	\$379,458	\$12,996	\$0	\$12,053	\$10,788	\$23,129	\$0	\$102,112	\$91,395	\$49,869	\$0	\$1,644,034
17	\$232,384	\$575,991	\$38,989	\$0	\$11,579	\$7,210	\$69,386	\$0	\$98,094	\$61,082	\$49,869	\$0	\$1,144,584
18	\$540,687	\$166,012	\$12,996	\$0	\$13,435	\$3,767	\$0	\$51,985	\$113,821	\$31,911	\$49,869	\$0	\$984,483
19	\$1,156,094	\$313,128	\$12,996	\$0	\$19,921	\$17,943	\$185,030	\$0	\$168,760	\$152,003	\$49,869	\$0	\$2,075,743
20	\$54,936	\$0	\$0	\$0	\$5,007	\$0	\$0	\$0	\$42,419	\$0	\$49,869	\$0	\$152,232
21	\$0	\$0	\$0	\$0	\$1,732	\$0	\$0	\$0	\$14,674	\$0	\$49,869	\$0	\$66,275
22	\$486,161	\$461,564	\$0	\$0	\$9,886	\$2,833	\$23,129	\$0	\$23,996	\$23,996	\$49,869	\$0	\$1,081,435
23	\$19,726	\$0	\$12,996	\$0	\$2,324	\$0	\$0	\$0	\$19,691	\$0	\$49,869	\$0	\$104,607
<b>Total</b>	<b>\$7,387,960</b>	<b>\$4,955,987</b>	<b>\$142,958</b>	<b>\$12,996</b>	<b>\$130,005</b>	<b>\$69,206</b>	<b>\$462,574</b>	<b>\$259,924</b>	<b>\$1,049,835</b>	<b>\$562,639</b>	<b>\$1,072,188</b>	<b>\$74,804</b>	<b>\$16,181,076</b>

(1) Future costs based on IEC consultation cost estimates, discounted at 7%, and presented in present value terms.

(2) The number of Informal consultations is based on a ratio of one informal consultation to every formal consultation.



**Economic &  
Planning Systems**

*Real Estate Economics*

*Regional Economics*

*Public Finance*

*Land Use Policy*

## APPENDIX G:

### ARROYO TOAD DEA RESULTS, THREE PERCENT DISCOUNT RATE

**Table G-1**  
**Summary of Future Impacts within Proposed Critical Habitat (2004 - 2025), 3 Percent Discount Rate (1)**  
**Economic Analysis of Critical Habitat Designation for the Arroyo Toad**

CH Unit	Real Estate Development	Water Supply	Grazing	Mining	Road Construction	Utilities & Infrastructure	Military	CEQA	Consultations	Total (2)
1	--	--	--	--	--	--	--	--	--	--
2	\$715,075	\$0	\$296,904	\$159,579	\$5,915	\$3,819	\$0	\$65,779	\$278,629	\$1,525,700
3	\$5,996	\$31,199,492	\$0	\$0	\$2,697	\$1,741	\$0	\$552	\$91,130	\$31,301,608
4	\$10,401	\$0	\$0	\$0	\$0	\$38	\$0	\$274	\$71,213	\$81,926
5	\$691,332	\$21,947,053	\$113,835	\$0	\$90,293	\$37,546	\$0	\$20,043	\$234,721	\$23,134,823
6	\$24,276,209	\$0	\$0	\$159,579	\$161,489	\$87,575	\$0	\$705,304	\$930,264	\$26,320,420
7	\$39,182,853	\$11,098,186	\$0	\$0	\$83,028	\$45,026	\$0	\$1,134,655	\$1,288,658	\$52,832,406
8	\$2,737,280	\$0	\$0	\$0	\$25,542	\$13,851	\$0	\$33,430	\$113,616	\$2,923,719
9	\$1,338	\$0	\$45,534	\$0	\$8,490	\$1,535	\$0	\$11	\$105,106	\$162,014
10	\$79,392,581	\$0	\$0	\$0	\$459,692	\$278,661	\$0	\$974,806	\$1,229,228	\$82,334,968
11	\$22,988,045	\$0	\$0	\$0	\$2,303,044	\$54,203	\$397,708	\$278,662	\$349,686	\$26,371,349
12	\$59,040,770	\$0	\$0	\$0	\$544,778	\$34,609	\$0	\$321,404	\$417,935	\$60,359,496
13	\$49,546,148	\$0	\$0	\$159,579	\$380,250	\$206,209	\$0	\$271,276	\$556,336	\$51,119,799
14	\$198,580,937	\$12,122,576	\$0	\$159,579	\$784,573	\$242,193	\$0	\$1,076,864	\$1,410,724	\$214,377,446
15	\$118,360,338	\$0	\$37,945	\$0	\$0	\$99,908	\$0	\$644,407	\$820,000	\$119,962,598
16	\$249,463,124	\$14,566,552	\$0	\$0	\$1,181,904	\$242,413	\$0	\$1,358,778	\$1,653,664	\$268,466,435
17	\$60,172,817	\$44,755,334	\$129,013	\$0	\$0	\$232,875	\$0	\$328,151	\$711,747	\$106,329,937
18	\$140,182,492	\$2,867,748	\$0	\$159,579	\$0	\$270,209	\$0	\$763,508	\$1,113,631	\$145,357,168
19	\$300,203,808	\$1,111,399	\$326,327	\$0	\$0	\$400,633	\$0	\$1,632,529	\$2,265,790	\$305,940,487
20	\$4,173,876	\$0	\$0	\$0	\$185,696	\$100,703	\$0	\$79,843	\$216,571	\$4,756,689
21	\$0	\$0	\$0	\$0	\$64,236	\$34,835	\$0	\$0	\$94,285	\$193,356
22	\$37,573,332	\$0	\$31,874	\$0	\$366,643	\$56,967	\$0	\$706,572	\$843,683	\$39,579,071
23	\$3,387,878	\$2,926,274	\$0	\$0	\$86,199	\$46,746	\$0	\$27,993	\$148,817	\$6,623,907
<b>Total</b>	<b>\$1,390,686,631</b>	<b>\$71,297,307</b>	<b>\$981,433</b>	<b>\$797,896</b>	<b>\$6,734,467</b>	<b>\$2,492,296</b>	<b>\$397,708</b>	<b>\$10,424,840</b>	<b>\$14,945,436</b>	<b>\$1,498,758,014</b>
<b>Annualized Impacts (3)</b>	<b>\$90,216,312</b>	<b>\$4,625,183</b>	<b>\$63,667</b>	<b>\$51,761</b>	<b>\$436,877</b>	<b>\$161,680</b>	<b>\$25,800</b>	<b>\$676,278</b>	<b>\$969,537</b>	<b>\$97,227,095</b>

(1) Impacts are discounted at 3 percent and presented in present value terms using 2004 dollars.

(2) Impacts resulting from project delay are not included in this total. Delay impacts are believed to be less than one percent of total impacts.

(3) Annualized impacts are calculated using a discount rate of 3 percent.

**Table G-2**  
**Summary of Future Impacts within Excluded Habitat (2004 - 2025), 3 Percent Discount Rate (1)**  
**Economic Analysis of Critical Habitat Designation for the Arroyo Toad**

EH Unit	Real Estate Development	Water Supply	Grazing	Mining	Road Construction	Utilities & Infrastructure	Military	CEQA	Consultations	Total (2)
1	\$260	\$0	\$0	\$0	\$1,126	\$727	\$90,000	\$13	\$71,437	\$163,562
2	--	--	--	--	--	--	--	--	--	--
3	--	--	--	--	--	--	--	--	--	--
4	--	--	--	--	--	--	--	--	--	--
5	--	--	--	--	--	--	--	--	--	--
6	\$99,094,712	\$4,758,853	\$0	\$0	\$0	\$0	\$0	\$2,918,762	\$3,083,606	\$109,855,933
7	--	--	--	--	--	--	--	--	--	--
8	\$15,051,855	\$0	\$0	\$0	\$115,298	\$13,851	\$0	\$183,834	\$196,341	\$15,561,179
9	\$46,589,485	\$0	\$0	\$0	\$183,244	\$98,606	\$0	\$383,651	\$450,730	\$47,705,717
10	\$0	\$0	\$0	\$0	\$1,516	\$822	\$0	\$0	\$551	\$2,889
11	\$22,346	\$0	\$0	\$0	\$0	\$43,656	\$1,590,830	\$271	\$64,993	\$1,722,097
12	\$42,326	\$0	\$0	\$0	\$0	\$31,304	\$0	\$231	\$21,206	\$95,066
13	\$97,631,218	\$0	\$0	\$0	\$203,143	\$109,397	\$0	\$774,780	\$850,065	\$99,568,602
14	\$59,035	\$0	\$0	\$0	\$0	\$96,055	\$0	\$321	\$64,680	\$220,092
15	--	--	--	--	--	--	--	--	--	--
16	\$99,076,781	\$0	\$0	\$0	\$0	\$216,970	\$0	\$535,835	\$685,200	\$100,514,786
17	\$147,917,426	\$0	\$0	\$0	\$0	\$145,008	\$0	\$813,361	\$916,581	\$149,792,377
18	\$43,035,516	\$0	\$0	\$0	\$0	\$75,756	\$0	\$234,427	\$286,931	\$43,632,630
19	\$81,190,708	\$0	\$0	\$0	\$0	\$360,854	\$0	\$442,170	\$687,239	\$82,680,970
20	--	--	--	--	--	--	--	--	--	--
21	--	--	--	--	--	--	--	--	--	--
22	\$35,901,336	\$0	\$0	\$0	\$0	\$0	\$0	\$670,823	\$694,806	\$37,266,965
23	--	--	--	--	--	--	--	--	--	--
<b>Total</b>	<b>\$665,613,005</b>	<b>\$2,379,426</b>	<b>\$0</b>	<b>\$0</b>	<b>\$504,327</b>	<b>\$1,193,007</b>	<b>\$1,680,830</b>	<b>\$6,958,479</b>	<b>\$8,074,365</b>	<b>\$688,782,867</b>
<b>Annualized Impacts (3)</b>	<b>\$43,179,498</b>	<b>\$154,358</b>	<b>\$0</b>	<b>\$0</b>	<b>\$32,717</b>	<b>\$77,392</b>	<b>\$109,038</b>	<b>\$451,409</b>	<b>\$523,798</b>	<b>\$44,682,568</b>

(1) Impacts are discounted at 3 percent and presented in present value terms using 2004 dollars.

(2) Impacts resulting from project delay are not included in this total. Delay impacts are believed to be less than one percent of total impacts.

(3) Annualized impacts are calculated using a discount rate of 3 percent.

**Table G-3**  
**Summary of Past Impacts within Proposed Critical Habitat (1994 - present), 3 Percent Discount Rate (1)**  
**Economic Analysis of Critical Habitat Designation for the Arroyo Toad**

CH Unit	Real Estate Development	Water Supply	Grazing	Mining	Major Road Construction	Other Road Construction	Utilities & Infrastructure	Military	Consultations (2)	Total
1	--	--	--	--	--	--	--	--	--	--
2	\$0	\$0	187,804	\$307,521	\$0	\$0	\$0	\$0	-	\$495,326
3	\$0	\$0	0	\$0	\$0	\$0	\$0	\$0	-	\$0
4	\$0	\$0	0	\$0	\$13,934	\$0	\$0	\$0	-	\$13,934
5	\$0	\$0	122,017	\$0	\$0	\$11,011	\$98,748	\$0	-	\$231,776
6	\$0	\$0	0	n/a	\$338,427	\$3,582	\$447,601	\$0	-	\$789,610
7	\$0	\$0	0	\$0	\$0	\$0	\$0	\$0	-	\$0
8	\$0	\$0	0	\$0	\$0	\$0	\$0	\$0	-	\$0
9	\$0	\$0	10,609	\$0	\$0	\$0	\$0	\$0	-	\$10,609
10	\$0	\$0	0	\$0	\$818,675	\$0	\$208,141	\$0	-	\$1,026,817
11	\$0	\$0	0	\$0	\$343,944	\$0	\$104,052	\$299,093	-	\$747,088
12	\$0	\$0	0	\$0	\$0	\$0	\$10,972	\$0	-	\$10,972
13	\$0	\$0	0	n/a	\$76,000	\$0	\$10,972	\$0	-	\$86,972
14	\$6,908,588	\$0	0	\$0	\$1,973,146	\$0	\$605,354	\$0	-	\$9,487,089
15	\$0	\$0	63,339	\$30,331	\$0	\$3,183	\$10,972	\$0	-	\$107,825
16	\$0	\$0	0	\$0	\$0	\$0	\$10,972	\$0	-	\$10,972
17	\$0	\$0	126,677	\$0	\$0	\$0	\$112,683	\$0	-	\$239,360
18	\$0	\$0	0	\$48,679	\$0	\$0	\$115,734	\$0	-	\$164,413
19	\$0	\$0	393,079	\$0	\$0	\$3,800	\$10,972	\$0	-	\$407,851
20	\$0	\$0	0	\$0	\$0	\$0	\$0	\$0	-	\$0
21	\$0	\$0	0	\$0	\$0	\$3,690	\$0	\$0	-	\$3,690
22	\$7,809,824	\$0	4,576	\$0	\$1,189,650	\$0	\$0	\$0	-	\$9,004,050
23	\$0	\$0	0	\$0	\$0	\$0	\$0	\$0	-	\$0
<b>Total</b>	<b>\$14,718,412</b>	<b>\$0</b>	<b>\$908,100</b>	<b>\$386,532</b>	<b>\$4,753,776</b>	<b>\$25,266</b>	<b>\$1,936,125</b>	<b>\$299,093</b>	<b>\$4,806,297</b>	<b>\$27,833,601</b>

(1) Impacts are discounted at 3 percent and presented in present value terms using 2004 dollars.

(2) Consultation costs include HCP preparation costs. Only total costs are presented as the exact (unit) location of some consultations has not been identified.